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Gothic Space

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Fig. 1. Hypostyle hall at Karnak.

MOST of the readers of this article, once or many times, have climbed the stairs from the train tubes of the Pennsylvania Station into the vast expanse of the concourse, and felt the sensation of well-being that this spacious interior gave them after the noisy compression of the train. All of them have had the same soothing effect from the wide panorama of a landscape. In both cases the source of pleasure is the same—the indeterminate roominess of the building or the view suggesting an infinitude into which one's personality willingly merges, seizing the chance thus offered to "get away from itself" and dissolve self-consciousness in the harmony of things as a whole.

But this love of indeterminate space is a peculiarity of the modern man alone, or at least of human beings since the thirteenth century, since we find no passion for landscape in either ancient art or literature, and no unlimited space effects in ancient architecture. Some one has said that Petrarch was the first man to climb a mountain for the view, and certainly the Gothic cathedral was the first building that deliberately united its interior with all outdoors. The ancients did not like such effects; not only did they avoid the profusion of windows common to modern and Gothic buildings, by which interior space is connected with space in general, but they were very slow to admit the use of space at all as an æsthetic factor in architecture.

The most striking example of this is afforded by the Egyptian pyramids, which have no space at all save for a diminutive tomb-chamber whose location within the pile was a secret lost with the builders. The Egyptian temple also excludes interior space from its effect, whether it be of the underground variety or the more imposing structure above the soil. In the subterranean temples the chambers have their interiors dwarfed by colossal columns or statues, so that the space enclosed is measured thereby, losing the vastness which the observer would impart to them in unconscious comparison with his own dimensions. In the temples above the ground the spaces actually enclosed are small, and the ample areas of the open courts are not, properly speaking, æsthetic factors, for the space here treated is still so to speak in the raw material. It lacks composition and contributes scarcely more to the architectural effect than a pile of bricks awaiting the builder's hand in the workshops of the temple. Even the vast columnar hall at Karnak (Fig. 1), imposing though it is, supplies no grandeur of space composition, for here the bigness of the columns so subdivides the interior that the net impression left with us is that of the supporting masses.

Greek architecture, as one might expect, shows no example of such brutal suppression of the space element. Its

Fig. 2. Hermes, Eurydice, Orpheus. Rome: Villa Albani.

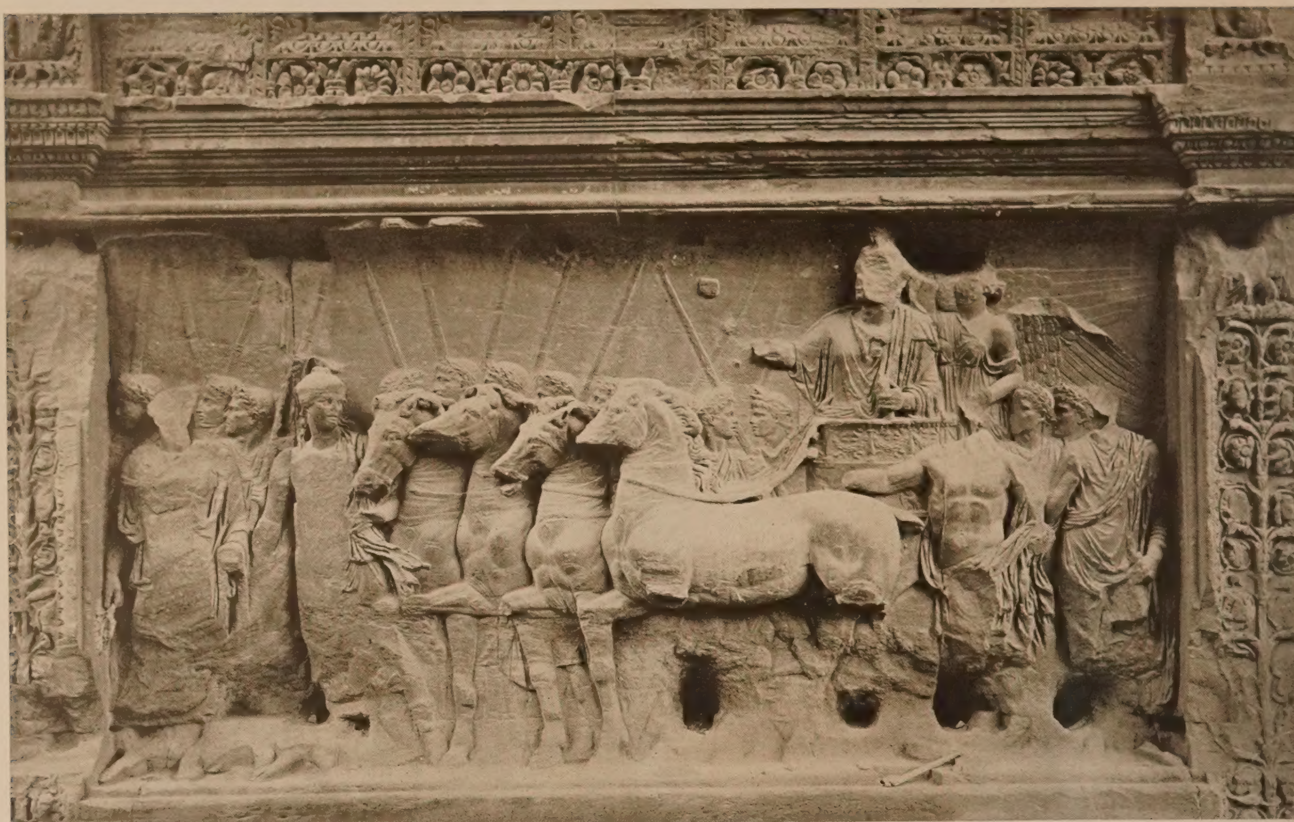


Fig. 3. The triumph of Titus. Rome: Arch of Titus.

sane harmony had a place for space composition, but the Greeks were characteristically antique in that the place they gave it was one of distinct subordination. No one hears much of Greek interiors; it is only the archæologists that are interested in the inside of the Parthenon. And if we lived in the days of Pericles and Phidias, and penetrated into the cella of that temple, we should find its interior dwarfed again by a massive colonnade, and also by the colossal statue of Athena, 40 feet high from the pavement. The fact is that the composition of a Greek temple is limited æsthetically to its outside porch, wherein the space enclosed is used as a subsidiary element, to relieve and isolate against a pleasing background of shadow the delicate refinement of the colonnade. The clear rendering of architectural *forms*, not voids, is what the Greek is seeking.

The Greek passion for the definition of form, and the consequent avoidance of spatial effect, becomes clearer when we look at an example from sculpture. In any Greek relief the space suggested is practically nil, the whole effort of the artist being devoted to the clear isolation of his figures. To this end he eliminates the dimension of depth, and one can realize his composition completely in terms of height and breadth alone (Fig. 2). If the modern soul loves the plunge into infinitude afforded by landscape vistas and vast interiors, getting relief thus from too sharp a definition of individuality, the ancient man had quite the opposite purpose, and strove always to make his outlines clearer and to isolate his concepts against the background of existence. Hence that search for definition of form, imperfectly manifested by the Egyptian, but becoming a passionate necessity in the Greek. Hence also the avoidance of space, because it blurs ideas of form, as any one can find out for himself by trying to recall offhand the details of columns, pilasters, capitals, or vaulting in the Pennsylvania concourse, only to find that such forms are swallowed up in the general impression of space. Such indefiniteness was very distasteful to the Greek mind; Aristotle even goes so far as to identify the unlimited with evil and the finite with good.[1] Contrast this with the concepts of mediæval and modern Christianity!

But as Greek art and thought passes on into the Hellenistic period, and thence into its Roman phase, this uncompromising hostility to space in architecture and sculpture becomes modified. It could not be otherwise in view of the sophistication of late Hellenistic culture, and the realism which the Roman genius injected into it. Roman reliefs, for example, forsook the old mythology and began to depict the exploits of contemporary emperors, too vivid in the memory of the beholder to be idealized in respect to place, and therefore demanding a more or less realistic treatment of environment, which inevitably introduced the dimension of depth and the suggestion of unlimited space. In the Arch of Titus at Rome (Fig. 3) we have for the first time the suggestion of atmosphere in the background of relief in the solution of the outlines of the lictors' staves into the final plane. The rendering of the procession also is very un-Greek; the ranks of men pass by as if seen from an open window, with little attempt to clearly define the single figures; most striking of all is the suggestion of the continuation of the procession to right and left instead of the careful framing by which the Greek sculptor avoids such impressions of unlimited extent.

Roman relief, therefore, admitted space into its effect

[1] Nich. Eth. II, 5: τὸ γὰρ κακὸν τοῦ ἀπείρου, ὡς οἱ Πυθαγόρειοι εἴκαζον, τὸ δ' ἀγαθὸν τοῦ πεπερασμένου. "For, as the Pythagoreans expressed it, evil belongs to the unlimited, and good to the finite."

Fig. 4. Marcus Aurelius sacrificing. Rome: Capitoline Museum.

in order to get the rendering of environment which the Roman realistic taste demanded, but even this concession is qualified in characteristically antique fashion. For never in Roman relief does the background *enclose* the figures; they are rather relieved against it, so that the space represented degenerates into a symbol instead of a real locality, and the personages never assume the size they should in proportion to the buildings or landscapes which appear in the background (Fig. 4). Man, not nature, is still the measure of all things, and human action remains the chief interest of the representation. We see then that space even in the Roman mind was never a vaster concept than man himself. It was a lesser thing, controllable and conceivable by the human mind, and hence not infinite but finite.

Now if we translate this Roman conception of space into architecture, we shall expect it to be at once like and unlike the Greek; like it in the avoidance of suggestion of the unlimited, unlike it in the admission of space as an æsthetic element of equal value with form. And so in fact we find it, for while in the Greek temple the æsthetic interest centres in the outside porch, the new building forms introduced by the Romans transferred the composition to the interior. In the Pantheon (Fig. 5), for instance, our admiration is divided between the dignified niches, columns, pilasters, the elegant coffering of the ceiling, and the vast interior which these provide. But the space thus set before us is all *enclosed;* the single opening which admits the light in the top of the dome plays no part in the composition. Such space is measurable and conceivable in geometric form, isolated from infinite space without, and thus still holding true to the classic ideal of clear definition.

The subsequent treatment of space composition in Roman architecture follows the trend of Roman art in general, which is toward the disintegration of the larger units into smaller ones, whereby the whole becomes divided up into separate unarticulated parts. Thus in Roman sculpture the figures begin to degenerate into manikins of disjointed movement, and in ornament the natural rhythm of plant forms breaks up into conventionalized units. So also in the great hall of the Baths of Caracalla, built a century later than the Pantheon, we find the single unit of the Pantheon replaced by a division of the interior into three bays, and each of these subdivided in effect by the groins of the vaulting, the huge engaged columns, and the vast openings of the lateral portals. And as Roman architecture passes into Byzantine the disintegration increases, but it is a disintegration of space effects rather than of forms that impresses us, for the columns, pilasters, mouldings, etc., gradually fade out of the effect. In Hagia Sophia such details are lost in the ensemble; the sole means used by the architect is space, which he piles up by constantly increasing units into a swelling crescendo (Fig. 6). From small half-dome the eye leaps to a larger one, and from this to the vast hemisphere poised over the centre, its tiny windows twinkling like the corona of a chandelier.

These windows are very small in proportion to the masses of masonry they pierce and to the expanse of interior space which they illuminate, and this is true not only of the windows of the dome but also of those that penetrate the great side-walls. There is, in fact, no intention on the part of the architect to open up his walls in the modern way; he still demands the isolation of his space after the ancient fashion. He splits it up into smaller units, it is true, but balances them in perfect symmetry, moulds them in definite geometric forms, and merges them one after another into

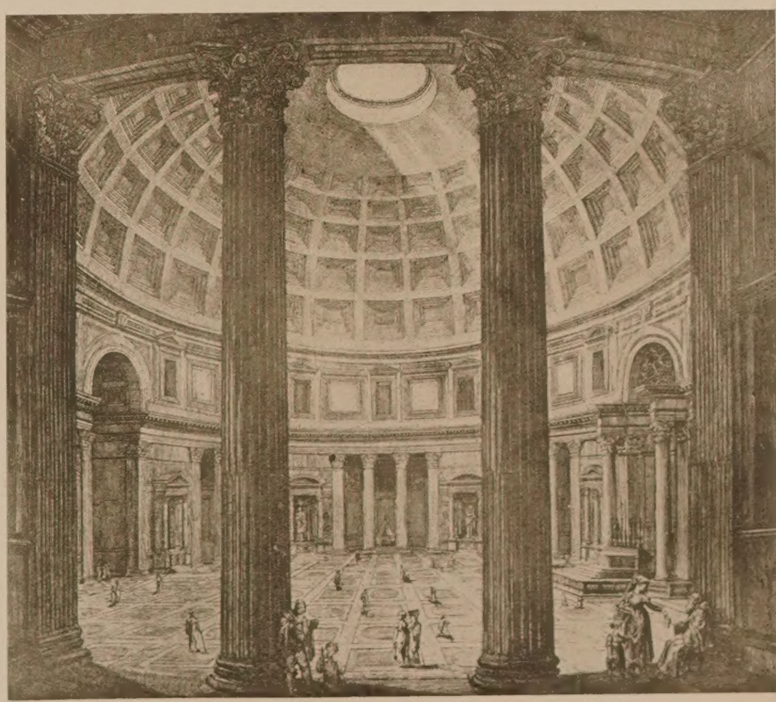


Fig. 5. Interior of Pantheon, Rome.

Fig. 6. Interior of Hagia Sophia, Constantinople.

the absorbing dominance of the dome. The unity of this interior is complete, and undisturbed by the intrusion of the infinite out-of-doors.

We have traced the evolution of ancient space composition[1] in so far as it was governed by the conservative attitude toward unlimited space which characterized the antique point of view. But the Gothic cathedral arose from none of the forms which we have described. Its genesis can be found in an unimposing structure which Western Christianity used for its churches in the primitive period, deriving its form and its name from the old Roman basilica, a rectangular structure with an interior colonnade, used for law-courts and other public purposes. The Latin basilica (Fig. 7), as this early type of Western church is called, is an interior composition like the domed churches which the Byzantines employed, but it contains two features which were quite opposed to the antique way of looking at things, and were therefore pregnant with change.

The first of these is the destruction of the classic symmetry of the interior. Its plan shows an interior colonnade and semicircular projection at one end which was called the apse, both of which are found in the Roman basilica which was its prototype. But if one looks at the plans of these older basilicas, it will appear that the interior colonnade is usually carried all around the building, masking the apse, and maintaining a classic symmetry and clearness of disposition. In the Christian basilica this symmetry is given up in favor of an axis that runs in only one direction—toward the apse. In fact, the whole interest in the Christian interior centres at the apse, because it is there that the altar is placed, and the eye and the imagination of the worshipper move very quickly along the colonnade to that point. I say very quickly, because there is little to arrest the eye. The columns are small, and their vertical lines are not continued in any way into the wall above, nor are they co-ordinated with the windows. There is thus an absence of vertical axes that would contradict and arrest the onward movement of the interior, which comes to an abrupt stop at the sanctuary of the altar and the apse. The abruptness of the stop, in fact, leaves a sense of unrest and incompleteness in these early Christian interiors, which will lead to interesting developments later, since the movement which is suggested by this interior space must sooner or later find an æsthetic outlet in space outside; for the first time in the history of architecture the interior has lost its symmetrical stability and is no longer self-sufficient.

The second feature of change in the Latin basilica is its clearstory. Here the windows are no longer mere decorative spots of light, as they were in Hagia Sophia, for they are too large to be thus conceived, and they flood the nave with light in a suggestively modern way. Such lighting shows a tendency to connect space inside with out-of-doors, and foreshadows the composition of Gothic interiors in which this union is accomplished. It is the point of view of Western Christianity timidly expressed in its first experiment in architecture, for the infinite, shunned by the Greco-Roman mind as unclear, and therefore evil, is courted by the Christian mystic, whose theory of salvation involves the union of finite humanity with infinite God.

Here then in the Latin basilica are the germs of future development of space composition—an axis of movement and the non-isolation of interior space.

The next stage in the progress toward Gothic is Romanesque architecture, which simply consists in putting a vaulted ceiling on the Latin basilica instead of the primitive wooden one. The various methods employed in doing this gave rise to the various schools of Romanesque—sometimes the builders vaulted the nave with a series of domes,

Fig. 7. Nave of St. Paul's, Rome.

[1] This sketch of ancient space conceptions is little more than a résumé of Riegl's brilliant essay on the subject in his *Spätrömische Kunstindustrie*.

Fig. 8. Nevers, St. Etienne; nave.

Fig. 9. Interior of Sainte-Chapelle, Paris.

as in the French school of Périgord; sometimes they used a series of cross-vaults, as in Lombardy, Germany, and Normandy, and occasionally in Burgundy; most often they covered the nave with a tunnel vault, as in Provence, Poitou, and Auvergne (Fig. 8). In the early Romanesque experiments the result is bad for space composition; the logic of the interior is usually lost, in that the horizontal movement of the basilica is maintained while the vaulted ceiling inevitably draws the eye upward without a proper axis to conduct it, leaving an unsolved contradiction.

Any vaulted interior composes naturally on a vertical axis. This was true certainly of the successful vaulted interiors which we have discussed, such as the hemisphere of the Pantheon and the more subtly mounting curves of Hagia Sophia. The Romanesque builders had thus started a counter-effect to the horizontal axis of the early churches, and they gradually began to feel this, and to work out its implications in two different ways.

Their first innovation consisted in slowing up, so to speak, the onward movement of the interior. This was done by gradually increasing the size of the supports, and correspondingly decreasing the width of the arched voids between, with the result that a slower rhythm is established whereby the eye moves more deliberately toward the altar; for it is a principle of decorative rhythm that if one element be overemphasized, the eye seizes it alone, and finding it always the same, moves quickly along the series of similarities thus provided. But bring the intervening counterfactor to equal prominence, and the eye is arrested by the difference, moving along the design more slowly, and with rhythmic progression. In this way the rapid movement of the early Christian interior was changed to a more dignified advance, heavy and significant, charging the approach to the altar with mystic meaning.[1]

The second method of breaking the horizontal axis lay in the simpler means of emphasizing the vertical one, and from this developed the characteristic feature of the *bay*, by which we mean the uniting of the nave arch with the wall above it into a vertical composition. To this end the triforium gallery was introduced and emphasized as time went on, and engaged colonnettes began to spring from the pavement, following the vertical surface of the pier, and crossing the nave in transverse arches. Thus, the nave splits up into vertical units, separated one from the other, establishing an upward interest that further impedes the horizontal movement of the eye. The final step is taken when the Gothic builders perceived the fitness of the pointed arch for this effect, since by it the upward movement comes to a point and vanishes.

This leads us to the second pregnant feature of the early Christian basilica, the clearstory windows. These constituted a serious problem for the Romanesque builders, for if they vaulted the nave, they either had to raise the ceilings of the side-aisles to brace the nave vault, thus shutting off the clearstory windows, or else take the chance of raising the vaulted nave above the ceiling of the side-aisles in order to retain these windows. In the first case they darkened their interiors; in the second they ran the risk of the nave vault's falling in. In the south of France they preferred a dark nave and a strong vault, but in the north, where the Gothic style was finally evolved from the Romanesque,

[1] This has been observed in detail for the Romanesque of Normandy by Pinder, *Rhythmik romanischer Innenräume in der Normandie*, Strassburg, 1904.

the builders insisted on the clearstory with its row of windows, taking the chances thus involved, or frankly reverting, in their earlier buildings, to the old wooden ceiling of the Latin basilica. As time went on, however, they found various ways to lighten and strengthen the unbuttressed vault of the nave, first by pointing the arches of the tunnel vault, to give a more perpendicular thrust, then by using the old Roman cross-vault, and finally by the innovation of the ribbed vault, whereby the whole superstructure of the church became a skeleton of arches, transmitting the thrust of the vaulting to the main piers, and self-supporting so long as these were properly braced by the flying buttresses which were eventually introduced outside. When this was done, the walls were no more necessary than they are in steel construction, and the builders, as this fact gradually dawned upon them, began to open up the sides of the clearstory, timidly at first and then more boldly, until in the developed Gothic edifice the clearstory walls disappear entirely between the piers, and every available bit of space is filled with glass (Fig. 9). Thus the upper part of the cathedral becomes a well of light, fusing the interior with the infinities of space without.

Fig. 10. Cologne Cathedral; nave.

This adds the last element to the trio that compose the finished Gothic conception of space composition: a vertical axis of movement, undefined (non-geometric) shapes in the spaces enclosed, and the freest union with space outside that will still retain an æsthetic concept of the interior. The flood of light from without is so strong that it must be stemmed with colored glass; the space enclosed is no longer defined, symmetrical, and self-contained, as was the Pantheon's, but is deprived of conceivable geometric form. Nor is it stable, but carried upward by the vertical axis of the bays, which have merged their horizontal divisions and strengthened the vertical ones so that the eye travels inevitably upward along the lines that lead to the summit of the windows, or the vaulting of the ceiling, and there disappear in the tips of the pointed arches (Fig. 10).

These pointed arches are, indeed, the epitome of the Romanesque quest and the Gothic discovery. The Romans never used them, preferring the finite semicircle. The Romanesque builders hit upon the form as a device for making arches stand without so much buttressing and to render the thrust of their vaults more nearly vertical. But as Romanesque merges into Gothic, and becomes conscious of æsthetic purpose, the pointed arch becomes the essence of the Gothic style—the symbol of the Christian point of view. It represents not the classic ideal of the isolation of form (finite reality) *from* space (infinity), but the Gothic ideal of the solution of form *in* space, wherein the mystic builders of the cathedrals felt the embodiment of God. This effort toward the dissolution of form grows and grows in Gothic art until it reaches an almost unendurable refinement; but in the details of the thirteenth century it results in works of exquisite beauty—tapering spires and flèches, sharp cusps and tracery that destroy the form of windows, crockets that break and dissolve the straight lines of the structure into the surrounding air.

Gothic space is thus simply the inclusion of the factor of the infinite in architectural composition. It is not surprising, therefore, that the Gothic cathedral constitutes the last creation in the field of monumental architecture of an original character that the world has witnessed, because it has supplied this *sine qua non* of modern conceptions. It is more curious that the element of unlimited space was so long in finding its way into the other arts, appearing two centuries later in the Flemish landscapes, and finding its full expression only in the plein-air painting of recent times.

We realize the infinite by feeling alone, whence it follows that Gothic interiors arouse emotion rather than ideas. This it was which the ancients abhorred in the effect of unlimited space; their intellectual ideals required an isolated and geometric interior. But as classic self-sufficiency decreased and man's dependence on the infinite grew, the builders were forced to include space as an essential element in architectural effect. The Romans still made it symmetrical, measurable, and finite; and so did the Byzantines, who were the true heirs of classic tradition; but Western Christianity had already undermined this attitude when it introduced the restless movement and flood of light into the Latin basilica. The Romanesque builders befogged the concept at first by shutting in the lighted interior with their heavy vaults, but gradually they felt the urging of the upward axis, and always in the north the necessity of opening up the interior to external space. From their efforts were born the magic interiors of Gothic, soaring higher and higher as the Gothic ideal became defined, and dissolving more and more the structural forms in the infinitude of space, until attenuation could go no farther, and the style lapsed from a mode of building to a mere veneer of tracery.

School Developments in the South

By James Russell Harris

Magaziner, Eberhard & Harris, Architects

ONE of the most promising and encouraging developments in the near South is the establishment of the various schools which cater to the youth of those local districts where before it has been impossible to secure more than a limited education. The Board of Education of the Methodist Episcopal Church and the Woman's Home Missionary Society have both been liberal backers of the movement, and are already showing results that more than justify their expenditures of moneys and their confidence in the work.

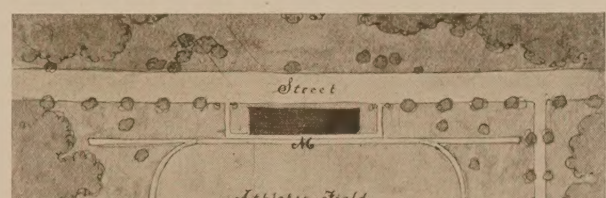
As architects we feel warranted in making these assertions, for in pursuance of our duties we have come intimately in touch with the movement. To proceed from generalities we shall discuss in detail some of these institutions now in operation which are improving their facilities by the latest and most modern methods and appliances. In no two of these establishments is the proposition quite the same. Therefore, each must be studied as subject to its own immediate environment and conditions.

The John H. Snead Seminary lies on the broad plateau of Sand Mountain, one of the Blue Mountain range, running diagonally through the north Alabama country. All through this mountainous and wilderness country live innumerable thrifty, upstanding farmers and woodsmen. They are descended, like the North Carolinians, from a stout old virility and kindly simplicity of their progenitors. No sooner was Snead Seminary established than there was a veritable rush to secure admissions for the sons and daughters of these mountain people. Some parents have driven fifty to a hundred miles from their isolated homes to the little village of Boaz, where the seminary is located, to place their children under its care.

So promptly did the people of the locality appreciate the advantages this seminary could offer that the establishment as promptly outgrew its facilities. Moreover, not only lack of room was the complaint but lack of proper equipment and facilities was emphasized. Realizing the truth of the demands of Doctor Fielder, the president of the institution, the Board of Education sent a commission, of which we were part, to look over the site and prepare a scheme for a proper development of the institution.

Plenty of land was at our disposal but not so—money. The wants were almost unlimited, but the means for satisfying were decidedly and wisely so. Here was not a site to erect elaborate and imposing structures—pupils must not live in an atmosphere which would tend to dissatisfy them with their position later in life. At the same time each boy and girl should have opportunity to live under the most sanitary conditions, in a healthy Christian atmosphere, and with surroundings that would appeal to his sense of service, utility, and beauty. How to best gain this result was partly the proposition put up to the architects. Several buildings were already on the site—a boys' dormitory, a girls' dormitory, and, lying between them, an administration and classroom building. The two former, while far from ideal architecturally, were commodious, sanitary (so far as ventilation and cleanliness went), and substantially built.

It was impossible to at once tear down the adminis-



Buildings marked *G*, *C*, and that part of *A* which is hatched in are the original buildings. Note the difference in grades. *A*, Administration and Classrooms Building. *B*, Girls' Dormitory. *C*, Girls' Dormitory. *D*, Girls' Dormitory. *E*, Chapel. *F* and *K*, Science and Industrial Work. *G*, Boys' Dormitory. *H*, Boys' Dormitory. *L*, Gymnasium. *M*, Grand Stand. *P*, Power-house.

tration building, owing to lack of classroom space; it was, therefore, determined to erect a new administration building on the site of the old one, but to erect it in units. We therefore designed the entire structure, but built only the two wings encompassing the present building. At their completion the school work can be conducted in the new classrooms and auditorium, which they contain, while the central unit will rise on the wreck of the old structure.

The simplicity of design, or almost lack of any, in the two dormitories demanded a very quiet treatment of the central building. We have therefore depended chiefly on the general lines of this building rather than on any decorative detail. The result, even in its present detached state, is eminently satisfactory. The maximum of light and air has been secured; the exterior, while conforming with neither of the dormitories, has proved a good compromise with both and serves to tie the three into a homogeneous whole.

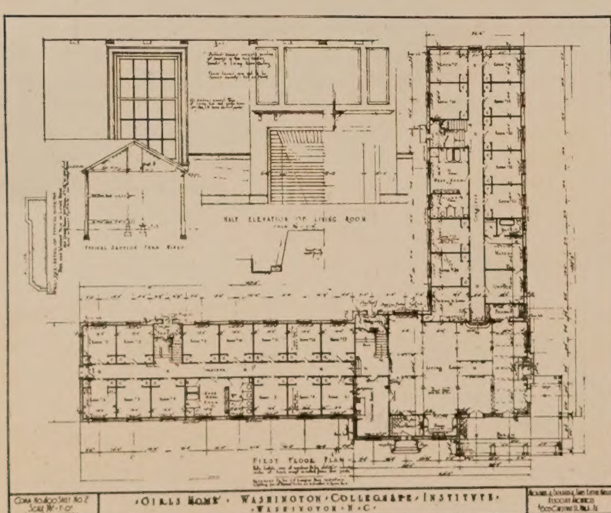
The most immediate necessities having been relieved, the commission turned its activities toward the development of a plan for the entire college plant which could gradually be realized as conditions would demand. The proposed new buildings are not set on rigid lines, as the college authorities particularly desire to preserve the atmosphere of domesticity which the college now possesses.

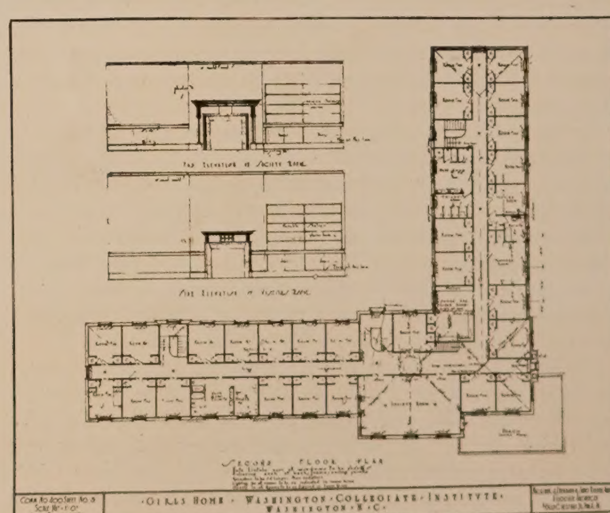
Between the administration building and the new girls' dormitory, to its north, an entrance-drive leads to the inner square or campus. This campus contains great possibilities for development.

This campus measures about four hundred feet in breadth by three hundred feet in depth. At each side, both north and south, dormitories are planned to line its borders, while toward the setting sun the view would be unobstructed. Beyond the campus a fall of about ten feet locates a second terrace on which will be located the chapel to the right and the library to the left. These two buildings will give distinction to this part of the plan, as they will permit of a more pronounced and dignified treatment than the more domestic buildings. Stretching beyond this second terrace, on a slightly higher level, the athletic-field bounds the western limit of the college grounds. On this last terrain are located the gymnasium, containing all necessary dressing-rooms for athletic teams, and the social building, in which will be located all the society, club, and other organizations connected with the seminary. Thus the buildings are all located in logical order—first, the administration and classroom buildings with attendant laboratories and workrooms; next, all living quarters, that is, dormitories and eating-halls; farther, the chapel and library, and finally the recreational features. It is now only a question of time until the entire concept shall be realized.

An entirely different but equally as beneficial proposition is the *Washington Collegiate Institute*, located at Washington, North Carolina.

This educational establishment draws from a most





View • from • Pamlico • River: Washington • Collegiate • Institute: Washington, North • Carolina.
Mileaser, Eberhard & Harris Architects Philadelphia

interesting territory for its pupils. Situated on the north bank of the Pamlico River, which itself flows into Pamlico Sound (that great inland waterway that is separated from the sea by a series of long, low-stretching islands), it is admirably located to attract the sons and daughters of the families that have been located in these deserted and forgotten islands for decades. Of course many come from the lowland districts of eastern North Carolina as well—but to the islanders it is an especial boon.

Washington, North Carolina, a very lively, up-to-date town, boasting of its precedence over all other Washingtons in age, has taken the institute under its wing, and the citizens are proud of possessing such a thriving institution in their midst.

The grounds lie a little to the east of the town and extend down to the water-front. This in itself, with its cypress-lined banks and the great expanse of blue water, is a fine asset. No two sites could be more unlike than this one at Washington and that at Boaz. An entirely new view-point is necessary for the proper solution of this problem.

At present there is on the site, at its northwestern extremity, one large brick building which answers the multifold purposes of administration, instruction, dormitory, and commons. It is vital that this building be relieved of its overpowering load and proper buildings be erected for the various departments. The commission and Doctor Fletcher, the president of the institute, both realized that a girls' dormitory should be the first new building, and this they are erecting at the present time. The building will accommodate one hundred students, has rooms of sufficient size to accommodate two girls in each, including their study-desks, and, moreover, is provided with a fine assembly-room for general gatherings, and a small library and writing-room for those desiring quiet.

The general style of architecture for this set of buildings has been suggested by both the church and domestic work erected in this part of the country, when attention was given to style and purpose in building. The Episcopal Church in Washington itself was an inspiration in conceiving the chapel for the institute. In plotting the general layout for the college, no variation in levels needed to be considered, as the ground inclines gently from north to south toward the river-bank.

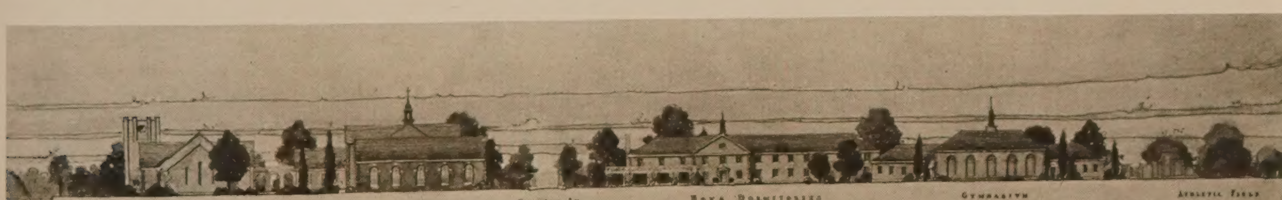
The boys' dormitory was already in situ; the only change here will be a sufficient addition to the present building to enable it to accommodate the increasing number of boy students.

The new general plan calls for courts, or squares, about which the various college buildings shall be grouped. These courts are to be separated by the new administration building, which will be located between the chapel group and the girls' dormitory group, and forming the third side of the hollow square which they border. The location of the administration building on the great longitudinal axis of the property and almost along the transverse axis gives it the necessary dominance, and also locates it in the most utilitarian manner. The boys approach it from the north and the girls from the south. The northern court becomes a men's court or quad with men's dormitories, athletic buildings and commons facing it, while the front court will provide a dignified and more reserved air surrounded by chapel, administration building, and women's dormitories. College Avenue, a recognized road, parallels the administration building to the north, and can be prolonged to encircle the various other buildings of the men's group, and finally lead directly to the athletic-field.

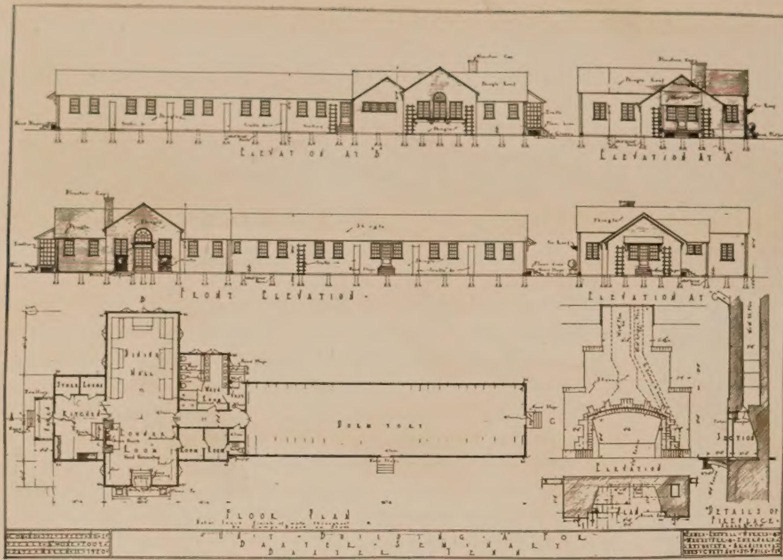
The chapel is very happily located, as it is bordered on two sides by roads, one leading directly from the town, and thus readily reached without traversing the college grounds. The less traffic on college property surely tends to a more scholastic atmosphere. It is simple and not too fine in detail, expressing the serious and workaday attitude of the student community. This type of architecture is symbolic of the old Scotch stock that dominates that part of North Carolina.

There is more roofing expanse to these buildings than to those of either Snead Seminary or of Murphy College, to be described later on. The decision to show ridged roofs to these buildings was based on the belief that where the country itself had no hill or mountain profile for background, the variation produced by ridge roofing the various structures thus would in itself effect a pleasurable variety of sky-line. Again an occasional cupola accentuates a bit of the assemblage of buildings, which should be emphasized. It is proposed to preserve an open expanse of lawn from the front of the administration building to the water-front, leaving only such trees as border the shore and form a leafy fringe to set off the stretch of college green and the encircling buildings.

The girls' dormitory is provided with blinds to all its windows, to give a rather more domestic and homelike feeling to the building. The general color scheme planned is a pigeon gray or dove-color. All exterior woodwork, such as sash, frames, and cornices, will be of a creamy white. The entire group has for background an extensive and noble



View of Buildings on West Side of Campus: Washington Collegiate Institute: Washington, North Carolina
Mileaser, Eberhard & Harris Architects Philadelphia



pine forest, some of whose members are of virgin growth and tower like sentinels above the surrounding woods.

At Baxter, Tennessee, a problem of entirely different type presented itself, but one which would be likely to occur sufficiently often to demand careful study of the conditions. Here, the main building had already been constructed, but, as usual, the enrolment had greatly outgrown the accommodation for students.

The building as designed is cruciform in plan, its greater axis formed by the dormitory units (to be increased in number as required)—the short axis composing the dining-hall and lounge-room—the upper arm of the long axis contains one unit, the kitchen and adjacent storerooms. In the present case the structure is but one story in height, but the scheme would not preclude two-story units where it might seem advisable. In such case, the living unit could be increased correspondingly in height. Each unit has ample space for six cots and intervening space, and these units could be added almost indefinitely. The wash and toilet rooms are located adjacent to the living-room unit, but should the building expand considerably, a second service unit could be located at the farther end of the sleeping units. This should prove an economic method of construction, and so simple that local builders could erect the structure understandingly.

The fourth and last problem we shall take under consideration is located at Sevierville, Tennessee, and known as *Murphy College*.

The old site for Murphy College had been made impossible by the bisecting its campus with the new railroad-tracks and the destruction by fire of its dormitory building. Losing no time, the president and his committee set about securing an option on a new property and a purchaser for the present one. A beautiful site was shortly determined on, and the commission was requested to inspect it and prepare plans for the complete layout in this new location.

The site selected is a ridge about thirty feet above the valley road, having a slight curve which conforms with the gradual bend of the Little Pigeon River Valley. It was one which left no alternative for the proper disposition of the building group. The only question was the locating of the central administration building and the juxtaposition in relation to this of the various other buildings.

Viewing the ridge from the roadway, the observer notes in about the centre of the curve a plateau of sufficient dimension to provide for the most important building of the group and a terrace in front of it. Therefore, the commission has located this central building on this spot. To give local color to the group, the architects have taken as a keynote the example of the Hermitage, the former home of Ex-President Andrew Jackson, a few miles out of Nashville, Tennessee. The dignity of the Hermitage and its simplicity of treatment both appealed to the designers as a prototype for these new buildings.

To the right of the administration building is the boys' dormitory, a long, low structure of only two stories, dominated by a cornice and attic. To the left the chapel is situated, very simple in its façade, but expressing faithfully its real dimension, which is incorporated more in its length than breadth. To the left of the chapel the land begins to rise into a cone-shaped hill, but still permitting sufficient shelf to place the girls' dormitories that curve forward with the incline of this shelf. Thus the appearance of these four important buildings from the roadway is that of a gently enclosing arc.

The absence of ridge roof is offset by the magnificent background of the Tennessee mountains, distant as they are—for they rise like great blue shadow-forms almost unreal in their haze. The architects, to better study the buildings of this group, had constructed a model to scale, placed on a contour base also to scale. This has proved eminently satisfactory for studying the best heights, locations, and orientation of the buildings, and has also been a big factor in assisting prospective contributors to visualize the entire scheme and to decide to give it their financial and moral assistance.

The college has already drawn on the mountaineer population of the great smoky mountains to such an extent that those people feel that this is their especial boon. When the new buildings are finally accomplished facts, no section, north or south, east or west, will be able to offer better facilities than will Murphy College to those who come under its influence.

Editorial and Other Comment

If

WE do not like the word very much, but it attaches itself to about everything that we could possibly say regarding the immediate present and future concerning building. If prices could be stabilized, if wages could be based on an honest and full day's work, if the uncertainties of future market conditions could be eliminated, if the solution of the great problems of adjustment that confront the whole world could be clearly visioned, the rest would be easy and the "if" could be eliminated from most of the questions that confront the architect and the rest of the world. According to the F. W. Dodge Company review, the construction industry is in very much the same position as it was in 1919. A spring awakening is predicted in some quarters, to be followed by increased activity during the summer and fall. While the amount of money involved in construction contracts in 1920 in twenty-five northeastern States was the same as in 1919, this amount of money—over two and a half billions of dollars—paid for a volume of construction that was *nearly one-fourth less in 1920 than in 1919.* The italics are ours.

The Real Crux of the Building Situation

OF all the things that have been said about the high cost of building, nothing has hit the nail on the head more effectively and accurately than a recent letter from Grosvenor Atterbury on "Labor and Housing." It is not a question of the cost of materials that is delaying housing, but the price of labor. The very people who are praying for homes are the ones who are making the building of homes impossible.

"Of all the items that go to make up the price of the working man's home, land, building, labor, and material, taxes, interest, and profits—by far the largest is the cost of labor—the thing he supplies himself. It is over two-thirds of the cost of the house itself. It is four or five times the cost of the land, and many more times the cost chargeable to taxes, interest, profits of employers and owners—even with graft included.

"What the situation cries for is a trade-union reformation. We should have membership on the basis of efficiency, like the old guilds. We should substitute levelling up for levelling down, and in place of the slogan 'An injury to one is the concern of all,' we should have 'The benefit of all is the concern of each one.'"

The Architectural League Exhibition in the Metropolitan Museum of Art

A VERY casual and rather hurried preliminary view, as we are going to press, of the Exhibition of the Architectural League in the new south wing of the Metropolitan Museum of Art gives us the impression of what great opportunities are there presented by the provision of adequate space for our art shows. This exhibition is one that should attract and interest the general public and by this means spread the gospel of good architecture in association with the kindred arts, sculpture, mural painting, and decoration. We have not had time at this writing to study details in the way of particular exhibitions, but first impressions incline us to look upon this exhibition as making a new start toward greater dignity, a happy reversion to type in the league's shows, and a new departure in the attitude of the Metropolitan Museum of Art toward the art of to-day. We are inclined to be somewhat enthusiastic in our views of this show, and we hope that the league's exhibitions may become an annual feature among the museum's special exhibitions. There is no place where it can be so adequately placed, and no place which seems to us more in keeping with the museum's own purposes of making it serve not only as a great historical review of the arts of the ages but as well a living inspiration for to-day. For years both the Architectural League and the National Academy have been wofully handicapped by lack of space. We hope to see the next academy show in the Metropolitan Museum, and believe that it would prove a great popular success for both the museum and the academy.

Princeton's School of Architecture

THE article in this number on "Gothic Space," by Professor C. R. Morey of the faculty of Princeton's School of Architecture, we feel sure will be read with interest by every one of our subscribers. This school is already meeting with notable success. Five of its students who recently entered a competition conducted by the Beaux Arts Institute of Design received distinguished recognition, winning one first prize and four honorable mentions. The Department of Art and Archæology, with which the School of Architecture is identified, is referred to as one of "the strongest departments of the university."

Professor Allan Marquand is internationally known for his distinguished work in the field of art and archæology, and he has gathered about him a group of able scholars and teachers, among them Professors Howard Crosby Butler, '92, Frank Jewett Mather, Jr., Charles R. Morey, George W. Elderkin, Baldwin Smith, and Shirley W. Morgan. Professor Butler, whose archæological excavations in the Near East are of world-wide fame, is the director of the School of Architecture. Associated with the school is an advisory board of prominent architects of New York, Boston, and Philadelphia. The school equips its students for the practice of architecture as a profession, and confers the new degree of Master of Fine Arts in Architecture. Its curriculum is founded on the sound conviction that "an architect should have a well-rounded education in liberal studies, that he should approach his profession primarily as an art, that he should understand and appreciate the other arts in their relation to architecture, and that he should be taught the science of building construction as a part of his training in design, rather than as an end in itself."

Workable Drawings

By David B. Emerson

THERE are working drawings and workable drawings, a slight distinction but a big difference, to which any builder or builder's superintendent will readily testify, and some drawings fail in their purpose by having too much on them, while others fail by having too little.

The draughtsman should not try to write the entire specification on the drawings, and yet he should put on enough notes to properly explain them. Another aid to the builder is marginal details to a larger scale on the plans, elevations, and sections, but in putting marginal details on the drawings the draughtsman should always remember to put the details on the sheet where that particular piece of construction occurs: not like a draughtsman of the writer's acquaintance who put a detail of basement construction on the roof plan,—as he naïvely put it—"because there was room on that sheet and the builder would find it anyway." How many things are left for the builder to find, and how many, as a result, are not found until afterward, and the builder pays the bill or the owner pays an extra.

Right here let me repeat what was said to me by one of the older architects, some years ago: "Always work under the assumption that every mechanic is a fool." Therefore, if drawings are made so they are fool-proof, or nearly so, they will not offend the sensibilities of the great number of very intelligent mechanics who are still with us, and will also prevent the less intelligent ones from making very natural mistakes, which are always liable to happen.

After the drawings are completed, and everything is properly indicated, the most important item on the drawings is the figures, and there is where many young draughtsmen fail. All four sides of a plan should be figured, even though the building be perfectly symmetrical and two of the sides be duplicates, as the writer has known of a case where the builder's superintendent laid out one side of a pilastered building by the figures, and the other side by scale measurements taken with a two-foot rule, and as the drawings were not accurately drawn, the result was startling to say the least.

All lines of figures should be continuous from end to end of the building, so that the builder may prove up his work and, if he finds any discrepancies, can report them to the architect for correction. Care should always be taken in putting of figures on the plans not to have them come on top of plumbing fixtures, light outlets, etc., as they are liable not to be seen, and if seen, may be very hard to read, as the blue-prints are very often not as legible as the tracings from which they are made. Also where wall thicknesses are figured, do not hatch over the figures; leave good-sized open spaces to call attention to the figures. Figures should be from rough to rough, that is, from brick wall to brick wall, or from stud to stud, as the work will be laid out and the rough construction set, and the finish put on that, and if the rough work is correctly set, the finish must naturally be correct.

All columns, beams, girders, and trusses should always be figured to centres, whereas it is a better practice in figuring brick and stone buildings to figure openings, pilasters, etc., to jamb or to arris. Don't figure to the axes of rooms, etc. It is better to figure from wall to wall, as in laying out the work the builder will have to double the figures, as he will not have the axis fixed, as an axis, like the equator, is an imaginary line; it is very necessary, in fact, indispensable in designing, but it can be wisely disregarded in the figuring, except in very special cases where it is the only possible station point from which to work. Always, in figuring, avoid the use of fractions which are not multiples of four, such as thirds, sixths, and seventeenths, as the mechanics use the divisions on the two-foot rule.

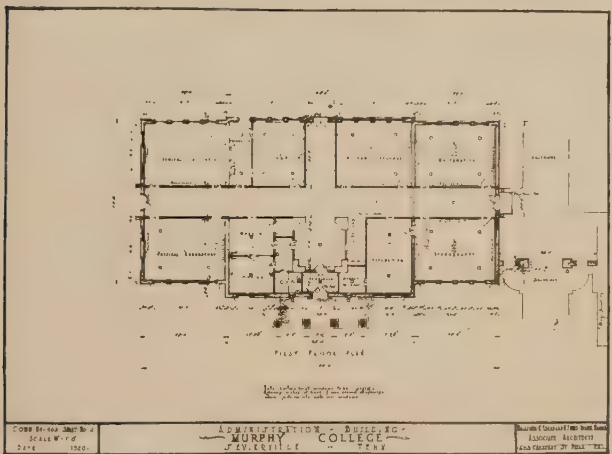
If there are three panels on the front of a building, it is a very simple matter to figure the centre one a quarter of an inch wider than the two side ones, and no human being, no matter how close he might look, would ever be able to tell the difference. There is one exception to this rule though, and that is, in figuring the height of the risers in iron staircases; which should always be figured in inches and decimals of an inch, as it is the custom in stair-shop practice to use a decimal rule in laying out risers. On the other hand, the treads should always be figured in inches and eighths. In figuring the risers in wooden stairs, divide the height from floor to floor by the number of risers, carrying the decimal out at least three places, and then by referring to the table on page four hundred and eight of the Cambria Steel Company's handbook, convert the decimals to the nearest fraction in sixteenths of an inch. Any little discrepancy will be taken up by the stair builder on the top and bottom risers.

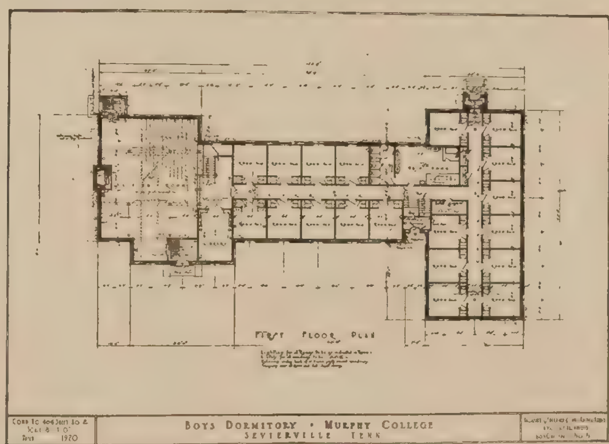
The young draughtsman will do well, for many reasons, to procure a steel handbook and become more or less familiar with its contents, as there are a great many helps in them which are not engineering matter, such as the sizes of structural shakes, the sizes of bolts and nuts, conversion tables, and much other matter which is very often needed by the architectural draughtsman in full-size detailing, figuring of plans, and other practical parts of his work.

The first and most important thing in drawing an elevation, and something which the writer has found it rather difficult to get the young man fresh from college to do, is to show the floor lines. As a presentation drawing, an elevation looks very well without floor lines, but on working drawings they are vitally necessary. Elevations and sections should be figured from finished floor to finished floor, and openings should be figured from finished floor to sill, and from sill to head. In figuring the heights in a brick building, they should always be figured to work out in brick courses, so that all courses will work out even. The Hydraulic Press Brick Companies of St. Louis publish a book of figured heights for the various thicknesses of brick courses, accompanied by a set of brick scales, which are a great assistance in enabling a draughtsman to work faster and more accurately, and most young draughtsmen do not always appreciate the cost value in getting out their work quickly. If the book and the scales do not happen to be a part of the office equipment, it would pay the young draughtsman to secure them for his own personal use.

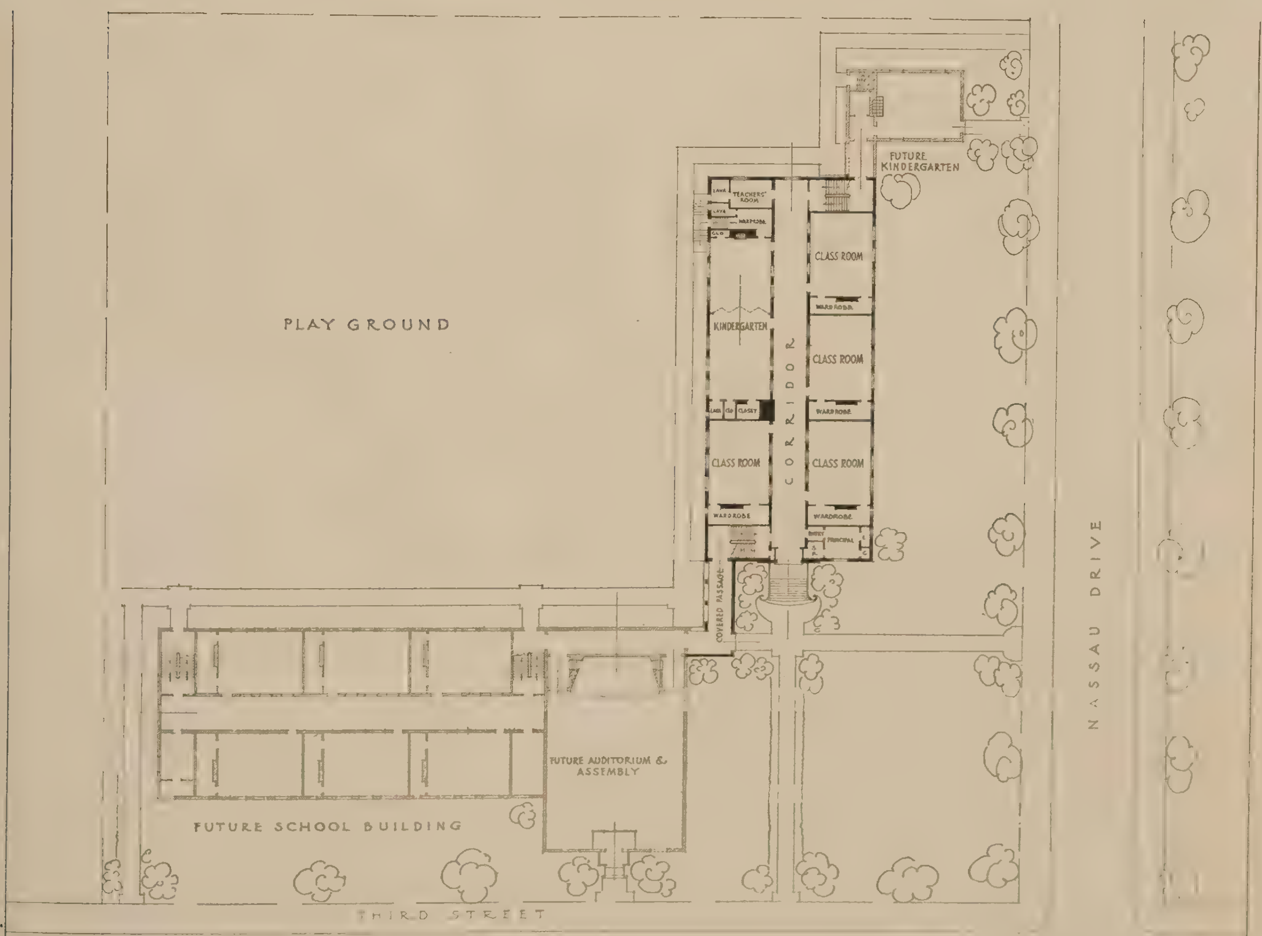
In making the drawings for city buildings, the building line (that is, the boundary-line between the lot and the sidewalk) should be shown on all plans and sections, and all projections beyond the building line, and all setbacks from the building line should be figured with relation to the building line. Also, the sidewalk grades should be given, and the grade of the finished first floor established with relation to these grades. These are simply a few of the many little things which the young draughtsman just starting out will have to learn, and although they may look trivial, and some of them are trivial, they will help to make the drawings more workable, and thereby make the work run more smoothly both in the office and on the job, and, incidentally, will make the young draughtsman more of an asset and less of a liability.

ENTRANCE, CHRISTMAS TOWER, EMMANUEL CHURCH, BALTIMORE, MD. Woldemar H. Ritter, Architect.



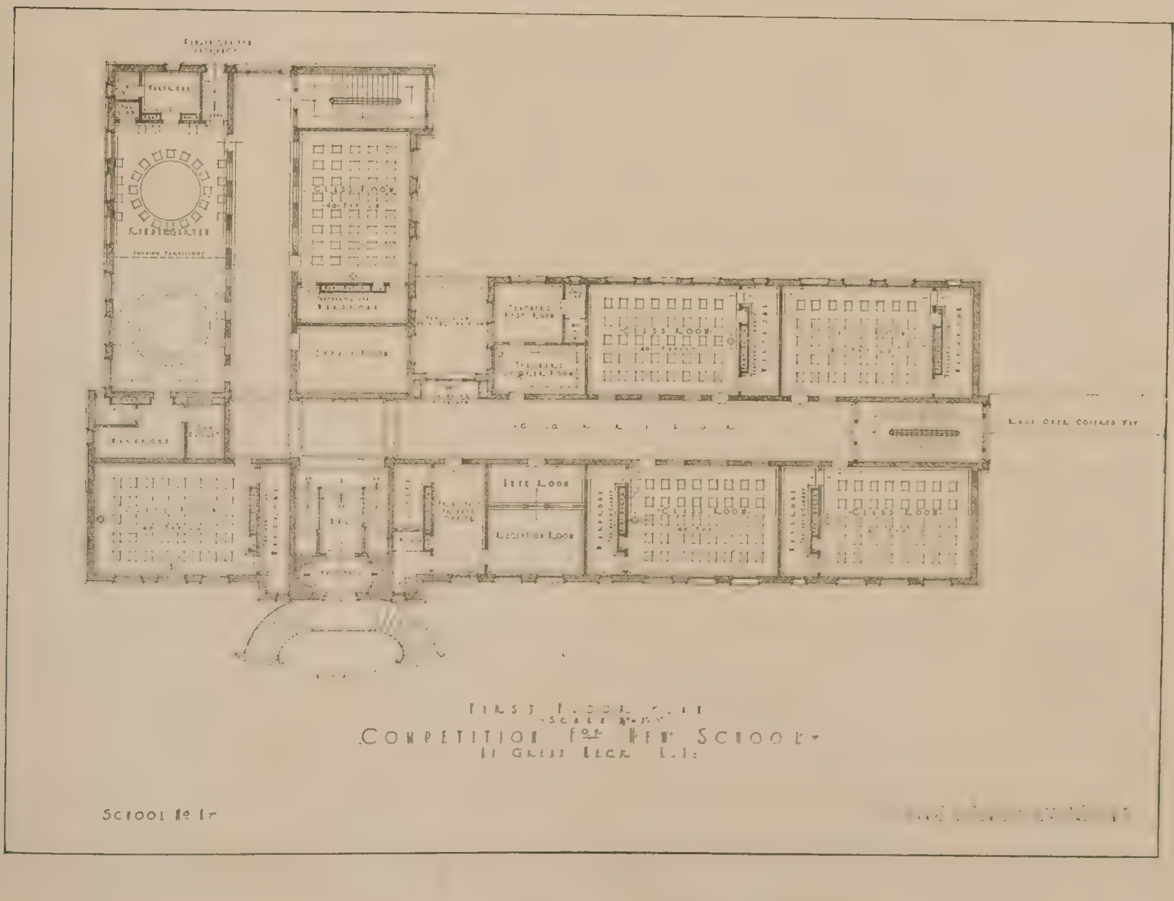


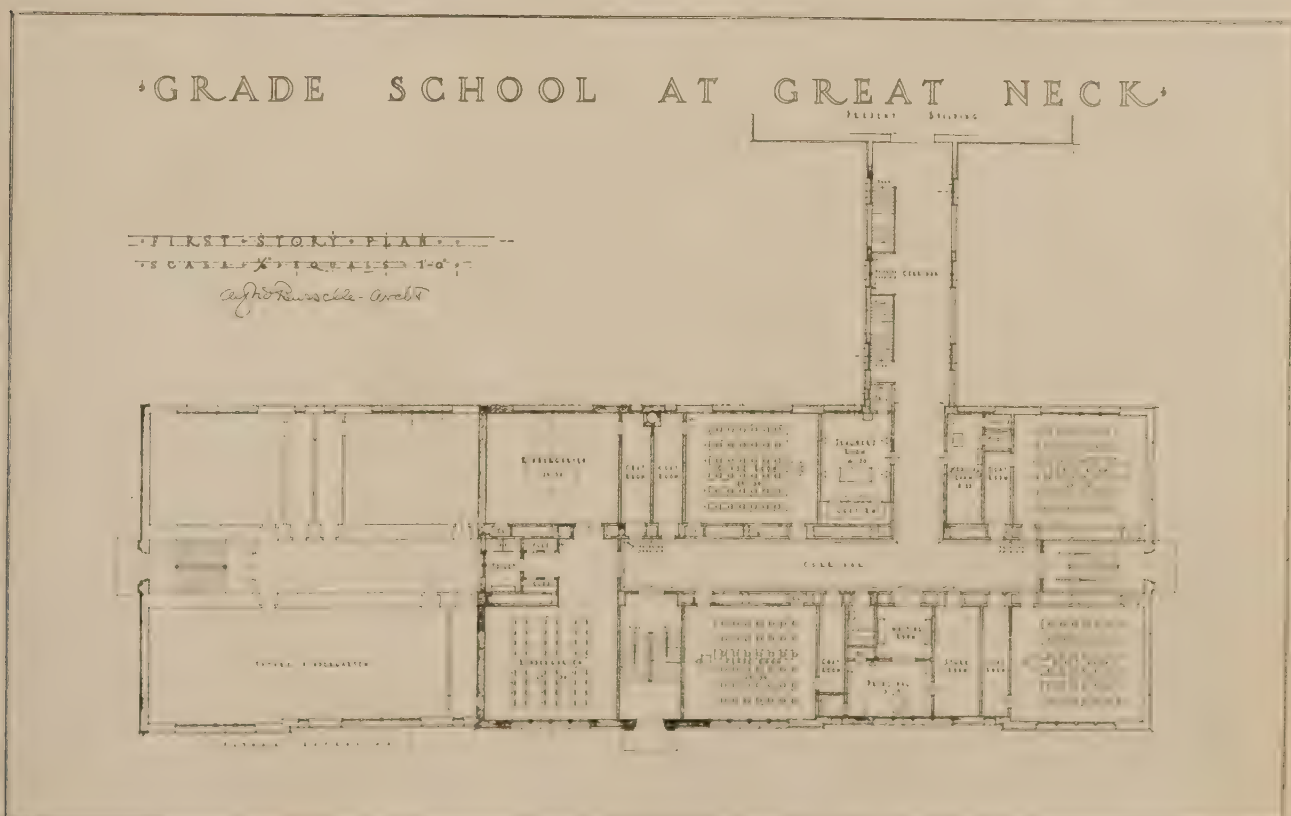
DESIGNS FOR MURPHY COLLEGE, SEVIERVILLE, TENN. Magaziner, Eberhard & Harris, Architects.



GENERAL LAYOUT FOR PUBLIC SCHOOL #2 GREAT NECK LONG ISLAND

WESLEY S BESSELL - FRANK GOODWILLIE ARCHITECTS 56 WEST 45TH ST N.Y.C


KINDERGARTEN
CLASS ROOM
CORRIDOR
REST ROOM
RECEPTION ROOM
FIRST FLOOR PLAN
COMPETITION FOR NEW SCHOOL
AT GREAT NECK L.I.
SCHOOL No 1

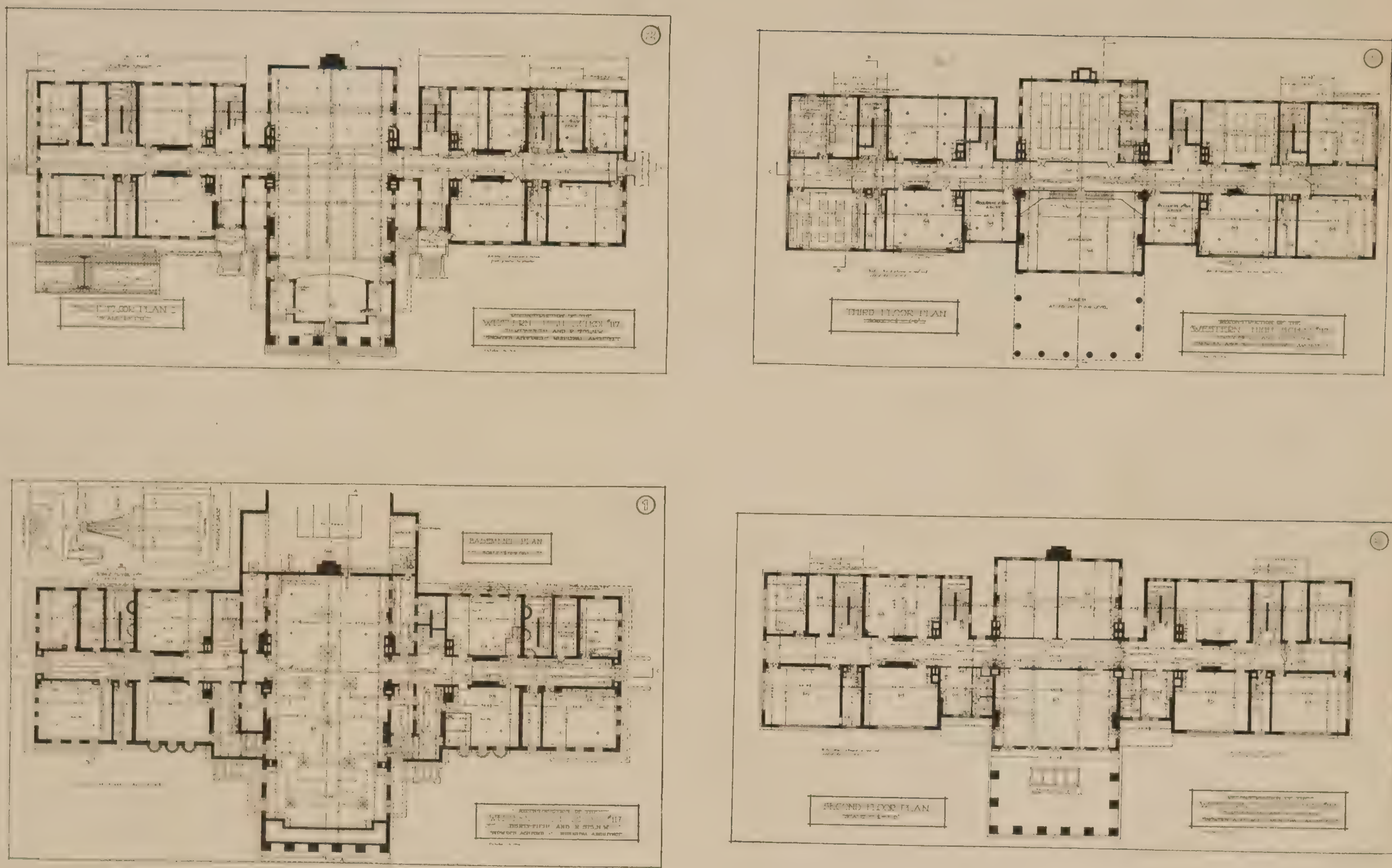


COMPETITIVE DESIGNS FOR NEW SCHOOL No. 1, GREAT NECK, N. Y.

Alfred Busselle, Architect.

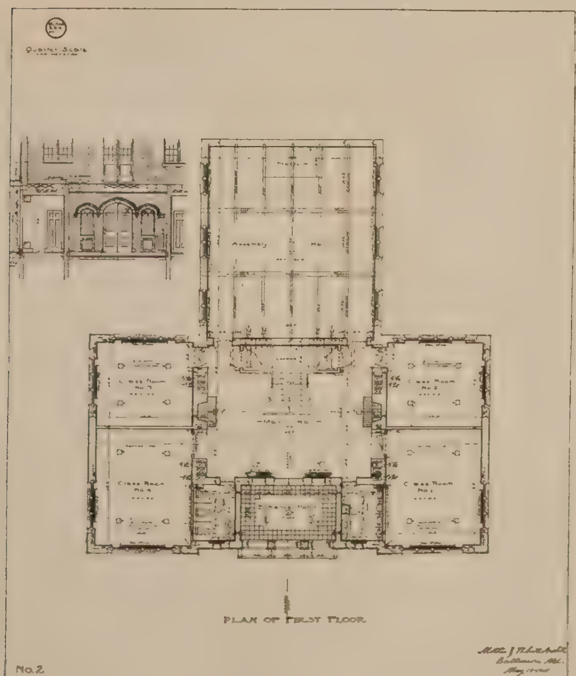
THE WESTERN HIGH SCHOOL, WASHINGTON, D. C.

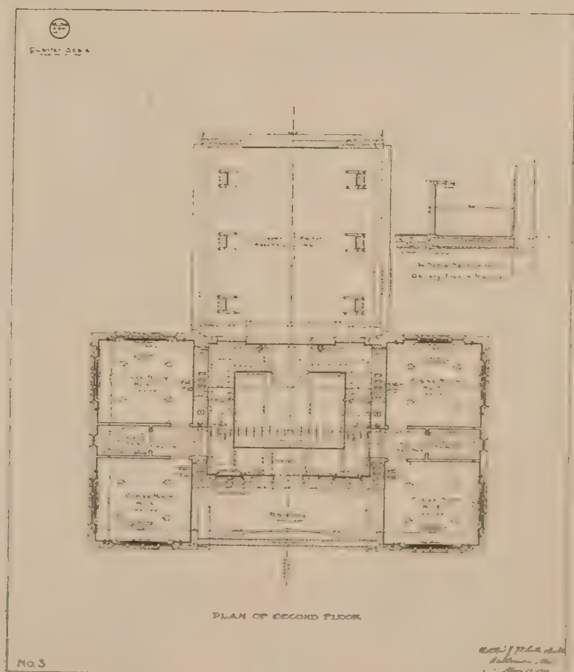
Snowden Ashford, Municipal Architect.



PLANS, WESTERN HIGH SCHOOL, WASHINGTON, D. C.

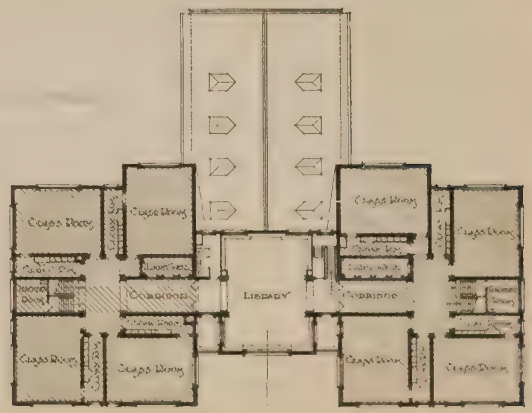
Snowden Ashford, Municipal Architect.





DONALDSON SCHOOL, HOWARD COUNTY, MD.

Mottu & White, Architects.



PARK VIEW HIGH SCHOOL, WASHINGTON, D. C.

Snowden Ashford, Municipal Architect.

CLOISTER IN NEW YORK CITY BACK YARD.
Designed by Francis Howard.

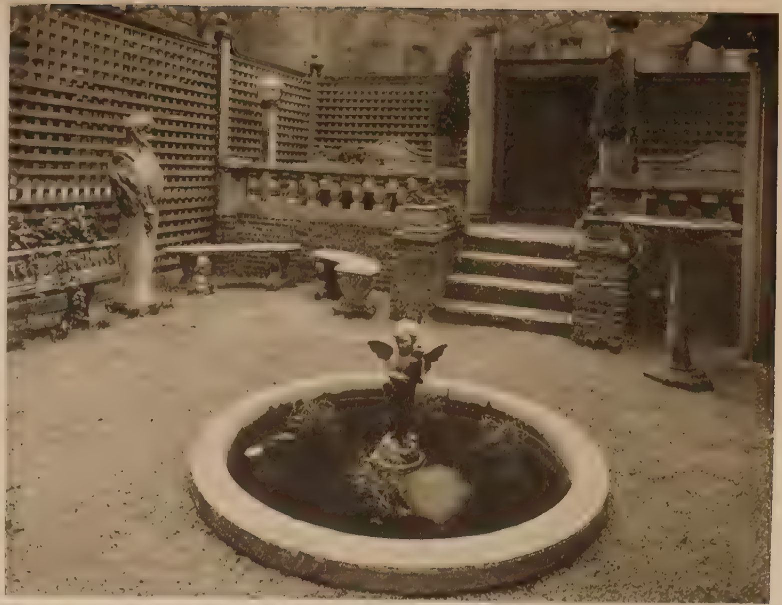
PERGOLA, NEW YORK CITY. Designed by Francis Howard.

TREATMENT OF PARTY LINE. Designed by Francis Howard.

SMALL GARDEN PAVILION. Walter Hopkins, Architect.

SOME CITY BACK-YARD GARDENS.

Back of Mrs. Hardy's house on Chestnut Street, Boston, is a small space which has been utilized as a back yard garden. Here we find a brick flooring, the red contrasting with the gray of the stone and the white of the trellis. Around three sides a small space has been taken for the use of flowers to give color value, and vines which will eventually cover the trellis. The setting here is painted furniture, the settle being a dark green with bright coloring.

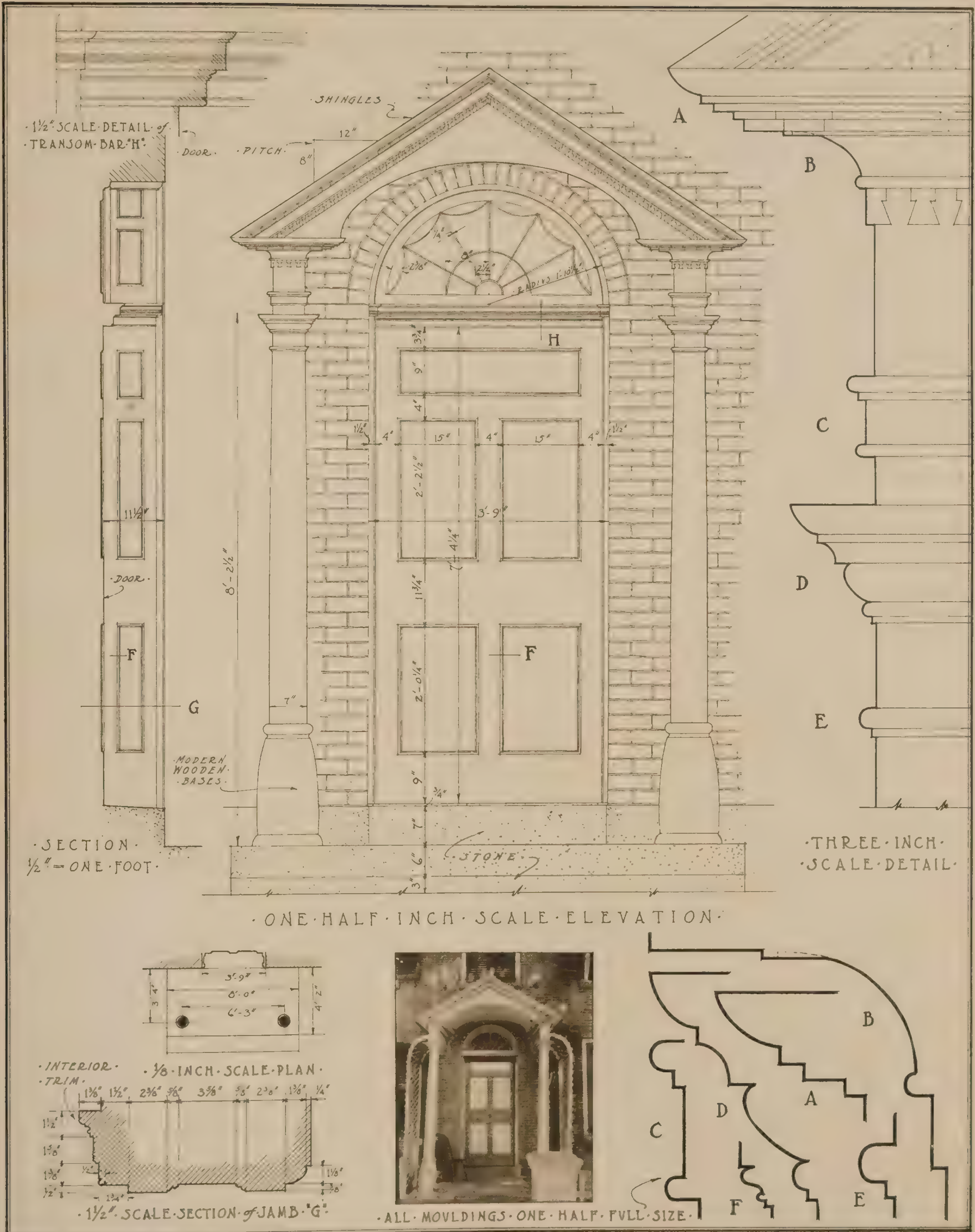


This back-yard garden is at the rear of Brett, Grey & Hartwell's office on Boylston Street, Boston, Mass. The tone colors are green and red, the green being shown in latticework and the red in the bricks laid in white mortar. This back-yard garden is on two levels, the upper one being furnished with seats, thus making it an outdoor living-room; the lower part is devoted to the different ornamentations used in gardens, such as fountains, bird-baths, settles, and statues. To the right is a trellis with fluted columns.

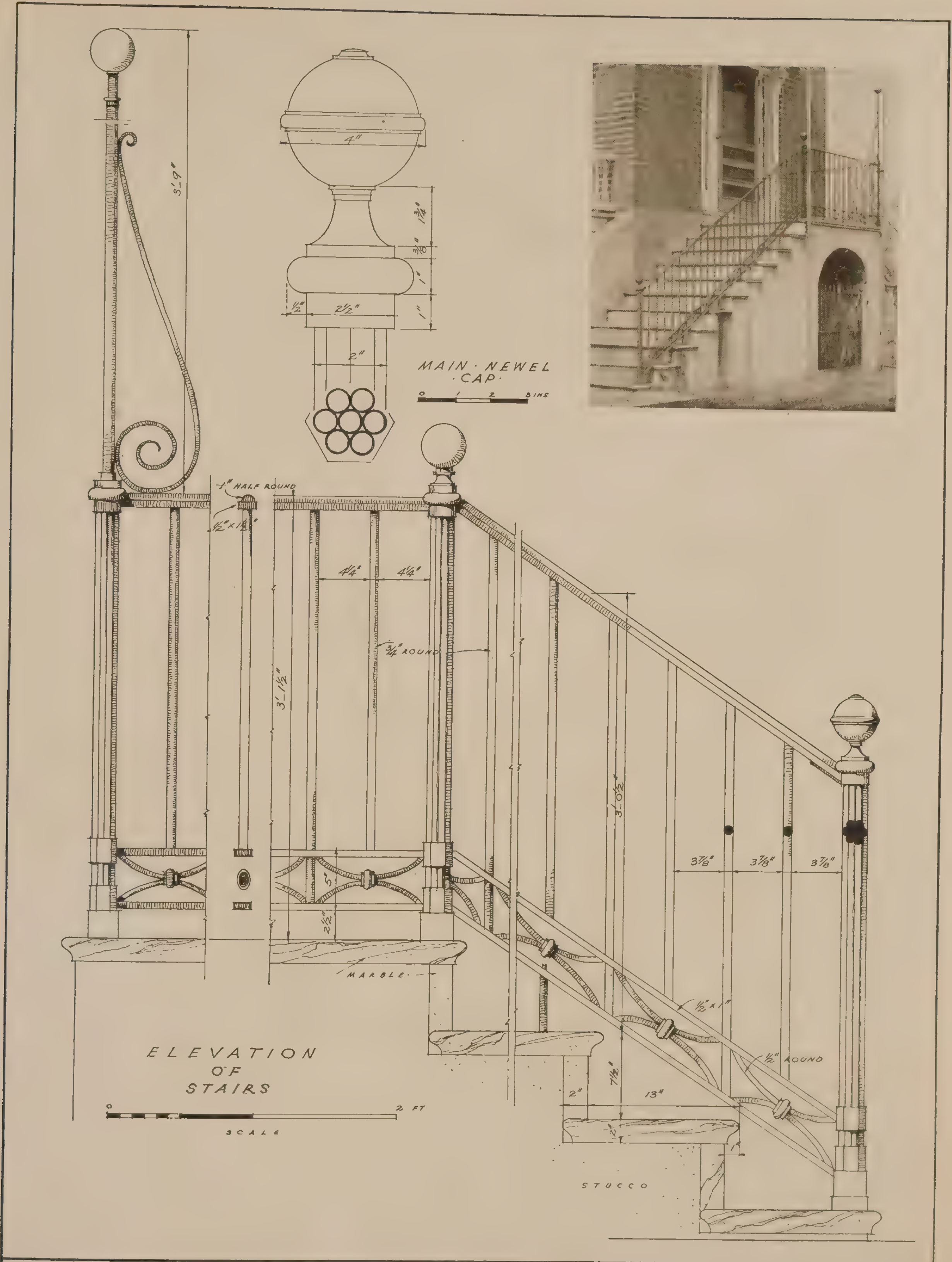
Mrs. Gardner M. Lane has chosen a charming little tea house at the foot of her lower garden. This is finished in white with green latticework. The furniture is of wood, painted green. The light is furnished by an old-fashioned lantern depended from the beamed ceiling. This is at Manchester, Mass.

Mr. Lester Couch, in his home in Danvers, Mass., has chosen a part of his back yard to make an outdoor living-room. Marble fragments stand inside of the Ionic columns, while flowers add a touch of color.

SOME CITY BACK-YARD GARDENS.



·EARLY· ·ARCHITECTVRE· ·OF· ·CONNECTICVT·	·FRONT·ENTRANCE·DOORWAY·of· ·THE·RECTORY· ·MONROE·CONNECTICVT·	·MEASVRED·BY· ·J·FREDERICK·KELLY· ·DRAWN·BY· ·LORENZO·HAMILTON·



EARLY ARCHITECTURE OF SOUTH · CAROLINA ·	· WROUGHT · IRON · STAIRS · ON · THE · DR PARROT HOUSE BEAUFORT · S · C ·	MEASURED BY DWIGHT · JAMES BAUM DRAWN BY VERNA COOK · SALOMONSKY

LIVING-ROOM.

HALL.

F. Burrall Hoffman, Jr., Architect.

HOUSE, MRS. L. T. DYER, SOUTHAMPTON, LONG ISLAND.

House, Mrs. L. T. Dyer, Southampton, L. I. F. Burrall Hoffman, Jr., Architect.

The Corinthian Order

By Egerton Swartwout

I HAVE shown in a previous series of articles on the classic orders of architecture that the development of the Corinthian order in Greece was due to the demand for an order which would be suitable for circular structures. The Greeks had used the Doric for some circular exteriors, but even with a relatively large radius the order was unsatisfactory, because the square projecting abacus contrasted badly with the curves of the entablature and its use was impossible in the necessarily reduced radius of the interior. The Ionic would have been even worse. The Corinthian, on the other hand, was admirably suited to circular work: it was a four-sided cap; the abacus, though inscribed in a square, was not straight-sided but curved, and was relatively much thinner and of less projection than the Doric; in fact, the use of the Corinthian for this class of work was a patent exhibition of common sense in design.

The most interesting and perhaps best-known example in Greece is the charming little monument of Lysicrates in Athens, one of the finest examples to be found in all architectural history of the development of an order for a special location. The peculiar arrangement of the volutes and of the leaves and the curves of the abacus are wonderfully conceived so as to harmonize with the sharply circular curves of the entablature when seen from below. In fact, a better cap for the purpose cannot be imagined. There is one other point which is especially worthy of note: the suppression of the usual fillet and torus at the necking. The actual necking is missing and only a sinkage is left; but the necking must have been originally of bronze, probably gilded and ornamented in high relief. The flutes do not finish in the usual manner, but are gathered into a leaf formation at the top. By these means the cap is virtually a continuation of the shaft, and the sharply circular line of the necking does not conflict with the curves of the entablature above, as would have been the case if the necking was normal in form. The effect is charming and the detail superb; but it is a small order designed for a very particular purpose; it cannot be used as a large order in stone, or, rather, it should not be. It has unfortunately been so used, but the effect is bad. This order and that of the Erechtheion should not be adapted.

It is quite palpably apparent that the cap of the little Lysicrates order is reminiscent of metal forms. This is evident from the detail of the volutes and from the curious and unusual rosettes on the leaves, which might represent some bronze method of fastening the leaves to the bell of the shaft, but there are earlier examples which are decidedly lithic in form and which were undoubtedly developed be-

cause of the necessity of an order which would be slighter in proportion even than the Ionic, and which would have a four-sided cap of small projection. Such columns probably existed in the interiors of some temples, noticeably in one instance in the axial column in the interior of the temple at Bassæ. It is, therefore, idle to assume that the Corinthian as an order had its origin in a metal form. Its origin was as above indicated, and its development in Greece was along lines of circular work.

There are other examples in Greece than those above cited, but not many. There is an interesting type in the interior of the Tholos at Epidaurus, also a circular structure, but the best-developed example is that of the temple of Jupiter Olympius at Athens. The temple itself was completed by the Romans, but the cap is undoubtedly Greek, and probably formed the prototype of the great orders of Rome. In fact, the Corinthian is distinctly a Roman order, and, unlike the other orders, attained its perfection not in Greece but in Rome. It is pre-eminently an imperial order, and well suggests the pomp and majesty of Rome, although it has not the simple monumental quality of the Doric, nor the grace and charm of the Ionic. Although it is slighter in proportion than the others, it is not weak or delicate. On the contrary, even with a column height of 10 diameters, it is remarkably virile and robust. The assumption of weakness in that proportion is one of the commonest mistakes in modern times. The columns of the temple of Vesta at Tivoli, which are relatively small, only a little over 23 feet in height, are about the most robust of Roman examples, being 9.46 diameters high; but this proportion is undoubtedly influenced by the location, for the temple is situated on the edge of a steep rocky ravine, and the columns seen in silhouette against the sky appear much slighter than they really are. The order of Mars Ultor, about the largest Roman order, has a column height of over 57 feet, and is slightly less than 10 diameters high, the actual proportion being 9.87. Jupiter Stator, 48 feet high, has a proportionate height of almost exactly 10 diameters. The circular temple of Vesta in Rome, about 33½ feet high, is nearly 11 diameters high. There is, of course, no definite rule. It is not a matter of size, for, as shown above, the largest and practically the smallest orders, Mars Ultor and Vesta Tivoli, both have a more robust proportion than the normal, which may be assumed as 10. I have tried many proportions in studies and in the model, and have used different proportions in actual work, but I have come to the conclusion that 10 diameters is the best in most cases. A heavier proportion is apt to be clumsy and does not seem to add any feeling of strength; in fact, it does not look strong, but fat. This clumsy feeling is enhanced in those cases in which the cap is proportioned to the diameter of the column and not to its height, a very serious error, which I will shortly take up.

I don't know just how the idea has become prevalent in the last fifteen years or so that Corinthian columns should be less than 10 diameters high. In the good old days we always made them 10, taking the order straight from Vignola, and getting away with it nicely. Nothing very skilful about it; no originality and very little thought; but the results were generally good. Later there grew up a distrust of our old friend, and Vignola was shelved, and some of us invented new and strange variations which, unfortunately, were often built, and in fireproof materials. Nothing short of a Zeppelin's visit or a Bolshevist uprising would help matters. A portico, for instance, would be drawn out painstakingly 10 diameters high; a critic would say that it was too skinny, and that we must make those poor columns more robust, and we would add the width of a line to each column, and feel much better satisfied. Another critic would appear and say that if there was one thing more than another to beware of, it was a weak, slender column, and urge us to put more power into it. And after this had gone on for a few weeks, the paper was pretty well worn out, but we had a row of fine, sturdy columns of almost Doric proportions. I think, too, that the rendering had a good deal to do with it. A column of 10 diameters when rendered looks very thin and meagre, because the outline of the column counts in with the dark background, and it is consequently necessary to make the columns about 9 diameters to look well in the drawing. It is the old story of paper architecture all over again, and there are, unfortunately, many melancholy examples of this paper architecture which badly mar buildings which are otherwise architecturally good.

I have spoken of the proportioning of the cap to the diameter of the column instead of to the height. This is a most prevalent and serious error, and it generally happens in this way. The caps that are to be found in the restorations are usually supplied with modular dimensions, the module being in most cases the lower diameter of the column. In Vignola always, and in the other books usually, the shaft is supposed to be 10 diameters high, though there is often no shaft dimension given. The architect has made his shaft, say, 9 diameters high. The module he uses is consequently much larger in proportion to the height than the one in the plate, and the result is that a cap proportioned to a graceful shaft is placed on a squat, sturdy column. The effect is bad. A fair-sized column has the effect of having lost 2 or 3 feet of its height. It is easy to test this by eye. Hold something in front of the base of the column and your eye will instinctively place the location of the base 2 or 3 feet below its actual location. One of the most unvarying proportions in the Corinthian order is the relation of the height of the cap to the height of the shaft. In Jupiter Olympius, Jupiter Tonans, and the Pantheon the proportion is 11.2 per cent, although the proportions of the shaft vary from 19 half-diameters in the first instance to 20.50 in the second, the Pantheon being 19.51. Jupiter Stator drops slightly to 10.9 per cent, that is to say the proportion of cap to shaft, and the extreme is found in Vesta Tivoli, which is 10.3 per cent, although this is a special instance in a peculiar location, as before noted. Only one cap, that of the frontispiece of Nero, is over 12 per cent. Vignola's proportion is 11.5 per cent, which he adopted doubtless as a mean figure of the caps with which he was familiar. Any proportion between 11.2 and 11.5 will probably give the best results under normal conditions. I think the proportion of Jupiter Stator—10.9 per cent—is a little too low. I used this proportion on the main order of the Missouri State Capitol; in point of fact the order was within an inch or two of the exact height of the Jupiter Stator order, and I have always felt the cap was just a little chunky. But the point I want to emphasize is that the cap should be considered in proportion to the height of the column, and not to its lower diameter, and that this proportion is generally constant in classic examples. If for any particular reason, as in the case of Vesta Tivoli, it was deemed essential to make the columns more sturdy, the Roman architect retained the relative height of his cap; the shaft was more sturdy and the cap naturally more chunky; a perfectly rational proceeding. Expressed in definite figures, in an order 20 feet high, based on the proportions of Vesta, the cap would be 2.06 feet high, and the lower diameter or module would be 1.08 feet. Now if the cap should be laid out according to Vignola, using the modular dimensions in relation to the lower diameter, the cap would be 2.48 feet high, .42 of a foot, or over 5 inches higher than

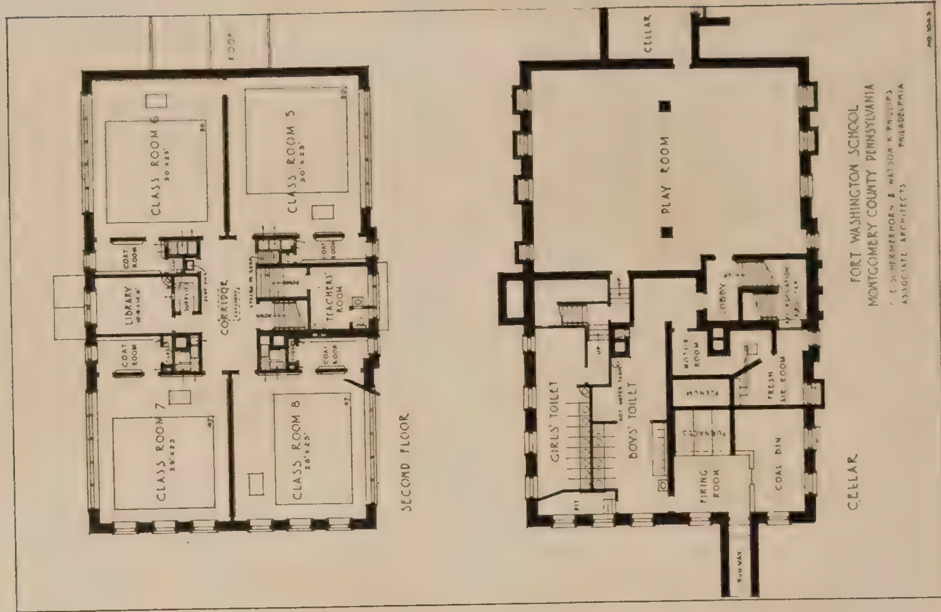
the Vesta cap; or, expressed proportionately, about ⅙ higher. It is strange that such a self-evident proposition as this proportion of the cap should be so often ignored, but there are numerous examples that will occur to everybody, and they can be seen even in monumental buildings otherwise excellent.

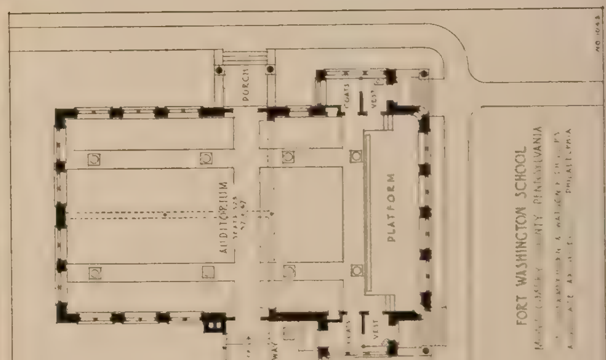
It seems trite to say that if the shaft is heavy in proportion, the cap should be heavy, and if the shaft is light and thin, the cap should be long and slender. It is A, B, C stuff; the veriest beginner would scorn such a statement; and yet the mistake happens, and happens often, and it generally happens in this way. The column is drawn in the original sketch at about the normal proportion with a cap of normal height. It is decided to thicken the column, and this is done without changing the height of the cap. So far so good; but when larger-scale drawings are made the draftsman never thinks of following the smaller-scale drawing. He takes the lower diameter if it is figured, or scales it carefully if it is not, and using this as a module goes blithely on his way, with the results I have above described. It is interesting to note that the colonial architect was thoroughly aware of this principle of the relative height of the cap, and invariably followed it when he reduced the column from a lithic to a wood proportion. He kept the height of the cap relatively as it was in stone, reducing the abacus and the mouldings to the smaller scale of the column, and putting into the necking the distance gained by this reduction.

As to the Corinthian cap itself, it is apparently the most complex and certainly the most difficult cap of all the orders to detail and model. I say apparently complex because its complexity is more imaginary than real. In principle it is simple, and is, as I have shown, merely an ornamented variation of the Doric. An abacus forming the termination of the shaft is logically and constructively joined to the shaft in a more graceful and decorative way than in the Doric. That is all there is to it. It is true the abacus has become relatively unimportant and is not straight-sided but curved, and the echinus of the Doric is lengthened into the bell of the Corinthian, and this bell is further ornamented by leaves, and the corners of the abacus are supported by volutes, but it is the same principle of the adjustment of a round to a square. This principle must be continually kept in mind by the architect and by the modeller, for the cap has such powers for complexity that it is the easiest thing in the world to complete a model which is stunning in the shop but confused and shapeless in its final location. As in all orders, but perhaps particularly in this, the size and location are of paramount importance in the determination of the detail. It should go without saying that the larger the cap and the farther away it is from the eye, the simpler should be the detail, the clearer its outline; in fact, in an order over 40 feet the outline is the whole thing. It must be remembered that the leaves must follow and echo the shape of the bell; in point of fact they are the bell, because the latter is so hidden by the applied leaves that it is scarcely visible at all. Now in order that the leaves may give the firmness of outline requisite at a distance it is necessary that they should be on one circular plane, and that the foliations of the leaf should cut below the surface of this plane, but that nothing should stick up above it. This principle is an essential one in all curved ornamented surfaces. This can be easily proved by inspecting a model with the sun on it, but can also be appreciated as a matter of common sense. On any surface circular in plan the sunlight catches and emphasizes any projections beyond the normal face of the curve. If these projections are slight and are also numerous, the points of light merge into the general light and shade of the surface as a whole, just as the projections of the moon's surface on a photograph. But if, however, they are relatively few and of considerable size and projection, they catch an undue amount of light, and the surface as a whole becomes confused and uncertain. It is precisely for this reason that it often happens that caps detailed by a mere beginner and modelled by an inexperienced modeller are often astonishingly good in execution, while a carefully studied model, beautiful in detail, will be confused and unmeaning when cut in stone and placed in position. The beginner takes Vignola and follows it slavishly, and the modeller follows this careful drawing; the foliations of the leaves in the drawing resemble a bunch of lady-fingers, and in the model are mere scratches on the surface; but by this very simplicity, which seems to us almost childish, a big effect is obtained.

One reason for the general confusion of outline in the modern cap is the prevalent custom of modelling only one-quarter or one-half of the cap, and another reason is the size of the model and its consequent warping. As I have indicated in a former article, every order should be modelled complete—cap, shaft, base, and entablature—at a scale which would be convenient to handle; not so large as to incur the danger of warping, and yet large enough to measure with great exactness. For the Corinthian order this model should be at a scale large enough to make the cap not less than 8 or 9 inches high, or if this size should be too large to handle in the shop or too expensive, it would be just as well to have the entire order modelled at 1½ scale, or even at ¾-inch scale if the order is a large one, and then have a separate scale model of the cap alone with a small portion of the shaft. The object of the model of the entire order is, of course, to study the proportions of the shaft and of the cap and the relation of the cap and shaft, and also the relation of the column as a whole to the entablature. The necessity of the larger-scale model of the cap is the absolute impossibility of criticising a very large model in the clay. The cap of a large order may be 5 or 6 feet high and will generally be seen not less than 60 feet away. Very few modelling-shops are equipped to handle such a large model, and in very few, indeed, could you get farther away than 20 or 30 feet. Then, too, in such a large cap the cast has to be made in sections. These warp considerably, and it is almost impossible to put these sections together so that the cap is perfectly symmetrical; the centre at top and bottom is almost certain to vary, and it is extremely difficult for the carver to point from such a model. It is also a hopeless task to measure or check it. In my opinion, therefore, a large-scale model is an absolute necessity. This model should be made from a careful but not necessarily a finished drawing, but a drawing that shows clearly the outline of the whole cap from the front and also on the diagonal, together with a plan of the abacus. No detail of the leaves, etc., is necessary if the modeller is experienced, but the shape of the leaves and their height and projection should be carefully shown. It may be asked from what source is this drawing to be made. Well, from any source you please; Vignola, if you like, from Despouy, from your own experience; but the modeller must have some information to start from.

(To be concluded.)





The old school building was converted into an auditorium for school and community uses and connected with the new school by a covered passageway.

Quads for Public Schools

By Wesley Sherwood Bessell

IN the study of the public-school problems the development of general plans and layout for interesting groups and grouping of buildings into quads and other interesting masses seems to have been untouched as yet by the architects who are making a specialty of school architecture.

With this thought in mind School No. 2 at Great Neck, Long Island, has been developed so that in the future, upon the completion of the entire group of buildings, there will be a semblance of college or preparatory schools, rather than the every-day set buildings which we commonly see in our communities.

The plan as laid out for Public School No. 2, Great Neck, contains in its major building just the necessary classrooms for present needs. In the future a building for separate kindergarten has been planned whereby the smaller children may be separated from the larger children, and in the same building will be located the janitor's quarters. Continuing with further developments, the auditorium as planned is a separate unit, which would permit of the use of this building by the community for entertainments and town activities requiring the use of a hall. In this wise no passage need be maintained through the school proper, so that the lighting up of the entire school building will be unnecessary.

A future building to accommodate additional classes is also planned. Upon the completion of this group of buildings a semiquad will have been formed, within which the playgrounds will be located.

In School No. 1 the same thought has been uppermost in the development of this building. The main entrance has not been centred, and the entire plan has been thought out along the lines of flexibility for future extension and additions. This building likewise is so planned that any additions made will only tend to create a more interesting school layout and will likewise develop a college feeling rather than the ordinary public-school appearance. The present high school, which was built some time ago, has formed the basis for this idea and is connected with the new school by a covered way.

The type of architecture used in the new buildings has for its inspiration the Georgian period, using a selected common brick for the main external walls, and a slate roof with fireproof floor construction throughout, with all the modern up-to-date school equipment.

Domestic Quality in School Design

By Alfred Busselle

THERE is probably no problem in an architect's practice that more calls for the quality of fitness of the design to express an emotional idea than that of the schoolhouse. If, as we claim, each building tells a story and creates a distinct impression, surely there can be no wider or more important field than that which so nearly affects the forming minds of children. It is not desirable, from any point of view, that children should spend much of their lives in buildings which are only distinguished from factories by the presence of the American flag, or which are of a grandiose type—wholly exotic.

It is, of course, right and proper that children should be acquainted with and influenced by monumental buildings, of which there should always be photographs upon the walls, and attention should be called to others which may be about them. But the inner life of the child and the inner influence of the school should be related to those of the home. When he leaves home in the morning he should go to a building which expresses intimate and homelike relation, the sort of relation which the modern teacher endeavors to carry on in the classroom.

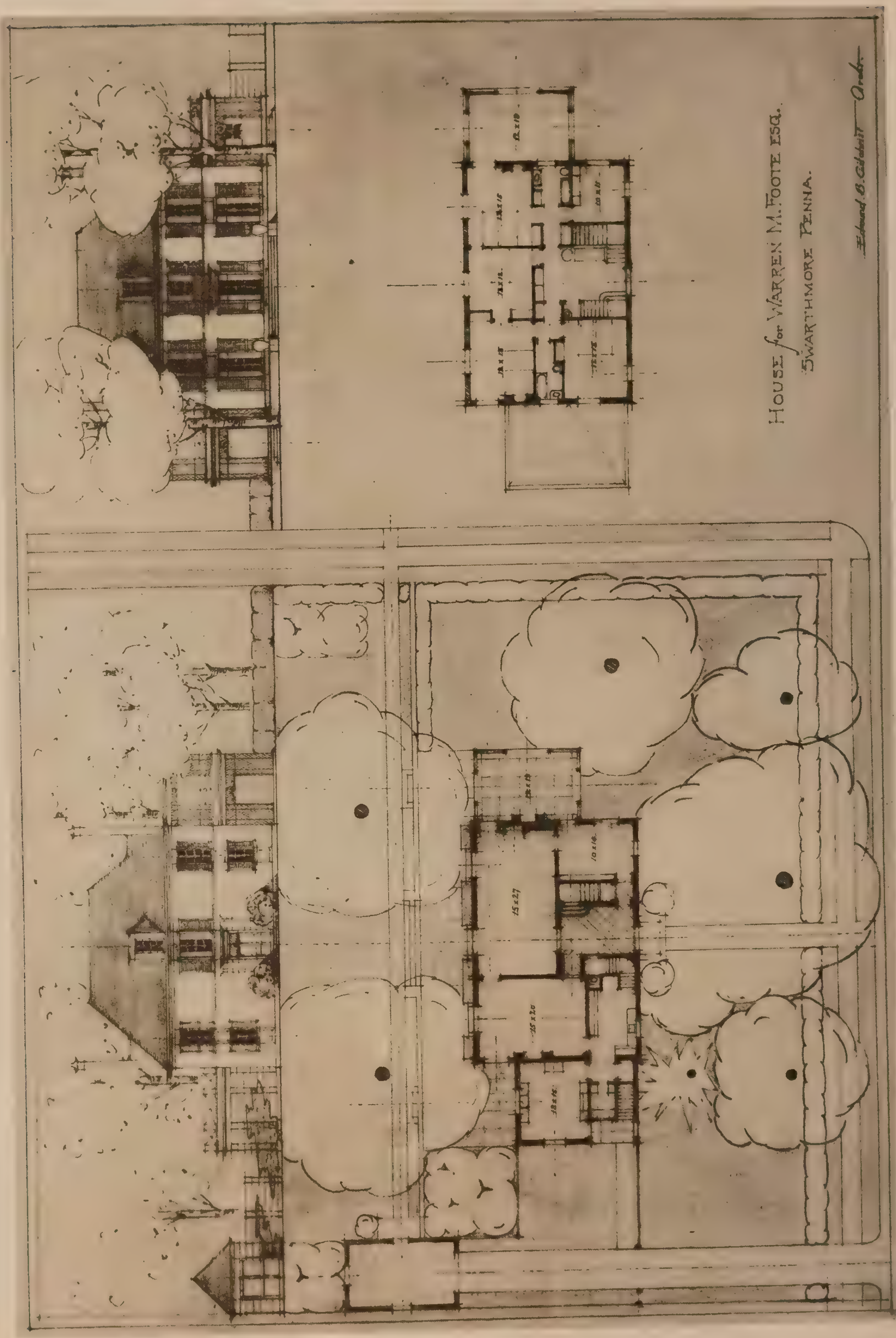
Architects, in designing schoolhouses, have too often, and I might almost say generally, worked along the easiest lines and have been taken up by the consideration of cubic feet of air, number of changes per minute, square feet of glass area, etc., and have lost sight of any spiritual factor in their problem. The architect, in attacking a school problem, often first transforms himself into an engineer, and afterward clothes the machine in such scanty architectural drapery as may allow him with reasonable grace to write "architect" on the drawings.

In our residential work we find our ancient American examples, all up and down our Eastern country, still the most expressive of domestic quality, still the closest linked to the homely virtues. If we have, and we do have, definite ideals of the sort of homes in which simple culture may most happily dwell and grow, surely it should be possible to carry these ideals into the larger opportunities of the schoolhouse.

Of course some schoolhouses are of enormous size and of necessarily limited area. In these cases the thoughts expressed would apply more largely to the interior than to the exterior of the buildings. I am speaking of the usual moderate-size building with reasonable amount of ground. In such cases it is possible to impart something of the domestic character and associate it closely with our best American tradition without sacrifice of mechanical efficiency or excellence of plan.

Special emphasis is laid upon the traditions of the early building along the Atlantic seaboard, because it is the principles of the Fathers of the Republic which we are endeavoring to instil into our alien races.

The design shown, Plate L, which was prepared in competition for a medium-size grade school, is an attempt to apply these thoughts. As always, the plan was the first consideration, but it is hoped that the outside will show that it is not really necessary to forget the home in the school.


HOUSE for WARREN M. FOOTE ESQ.
SWARTHMORE PENNA.
Edmund B. Gilchrist Archt.

The Christmas Tower, Emmanuel Church, Baltimore, Md.

Woldemar H. Ritter, Architect

THE style of the tower is continental Gothic, so familiar in old Flanders. The problem was complicated by the double necessity of providing ample vestibules, and at the same time avoiding a tower too massive for the church.

At close range the centre doorway becomes the dominant feature and is conspicuous for the richness of its carving. It represents the Christmas story, carrying out the name of the tower. Surmount'ng the arch of the great west door are five figures, the workmanship of Mr. John Kirchmayer, the well-known carver from Oberammergau, who has done so much of the distinctive ecclesiastical work in this country, and who is responsible for all the carving recently executed in Emmanuel Church, including the reredos. Mr. Kirchmayer has given us of his very best, and has entered sympathetically into all Mr. Ritter's plans. The figures represent the Virgin Mary holding the infant Christ, as the central Christmas group; on either side St. Anne, the mother of the Virgin, and St. Joseph, and again these are flanked by an old and young shepherd. Immediately below the archway, in little niches of their own, are the exquisite figures of eight child angels playing on musical instruments, suggesting the heavenly choir. Just above the door, in the carved woodwork, stands the Child Jesus, with the arms of the parish at his feet, and below, running across the arch, the message of Christmas: "Peace on Earth, Good Will Toward Men."

The vestibule is one of the most spacious in this part of the country, and on its walls is the memorial tablet associating the tower forever with the name of Ida Perry Black. Above the three doorways through which the congregation enters the church itself are the carved figures of six great

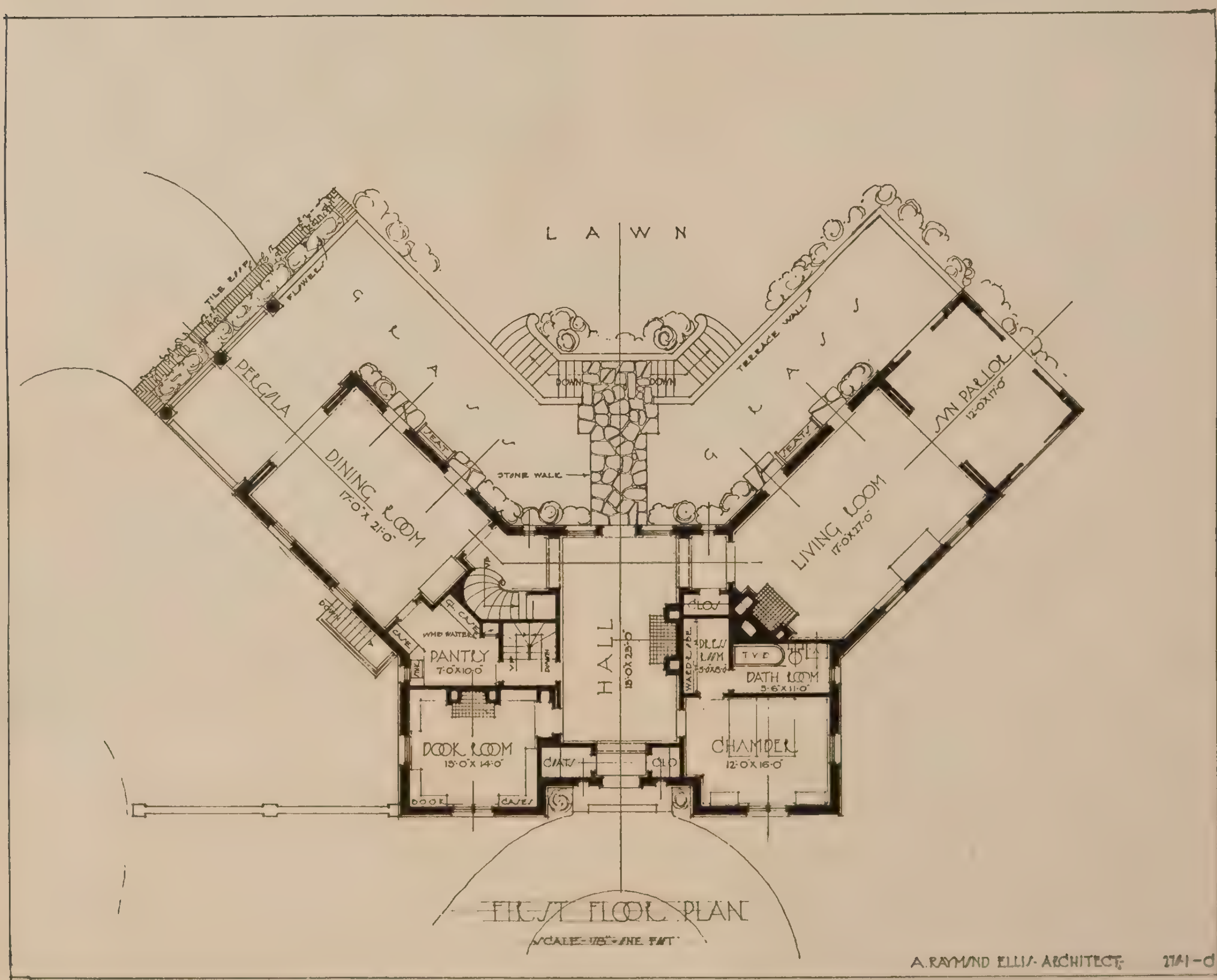
Reredos.

missionaries—St. Paul, St. Augustine, St. Denis, St. Gallus, John Elliott, and Bishop Brent. Half-way up the front of the tower stand the three heroic figures of the Magi in their niches, looking calmly down upon the passing traffic, and holding their gifts of gold, frankincense, and myrrh. The tradition regarding the wise men has been carefully looked into; their names, according to this tradition, were Melchior, Caspar, and Balthazar. They represent the three continents, Europe, Asia, and Africa, and are supposed to be twenty, forty, and sixty years of age.

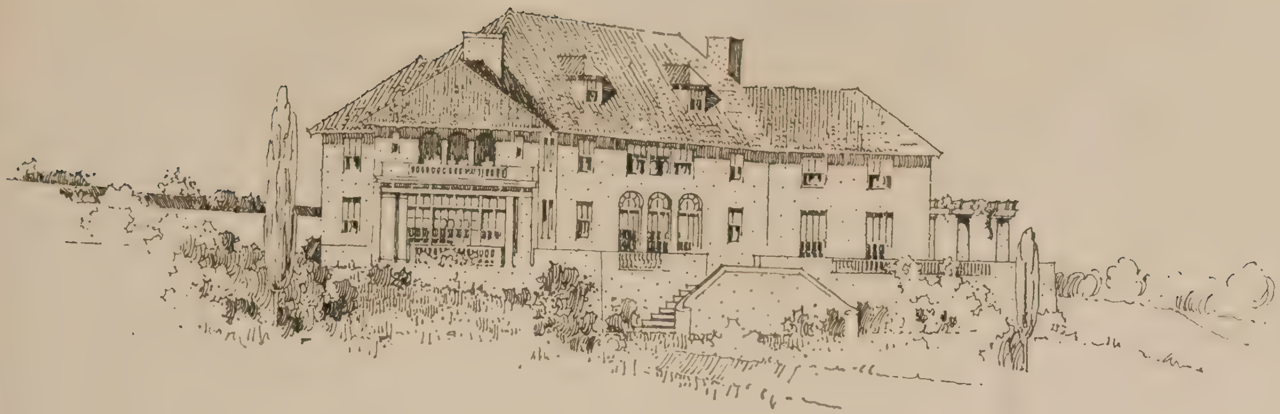
The tower is crowned by a gallery of pierced stone and surmounted by a pinnacle which, in the Middle Ages, represented the head of the stone stairs leading to the platform. This pinnacle has caused a great deal of comment, and it may be well to state here that it was placed there, in the first place, to break the regularity of the crest of the tower, and, in the second place, to suggest to the eye that the tower will eventually form part of a group of buildings which will include the new parish house. This slight elevation at the top assists in binding the projected buildings together into one composition.

We are glad to commend here not only the skill and faithfulness but the enthusiasm of the two hundred men who worked on the Christmas tower. They were deeply interested in the construction of the building, and entered into the spirit of the mediæval guilds, giving their very best. In spite of the severity of the weather, scarcely a day passed without some work being accomplished. We wish we could name them all individually, from the contractors, who sympathetically carried out this complicated and unusual structure with great ability, and the stonecutters, who demonstrated their skill in handling this difficult problem in a most effective manner, down to the humblest laborer, who did the necessary rough and arduous work under trained direction.

ELEVATION



DESIGN FOR RESIDENCE.



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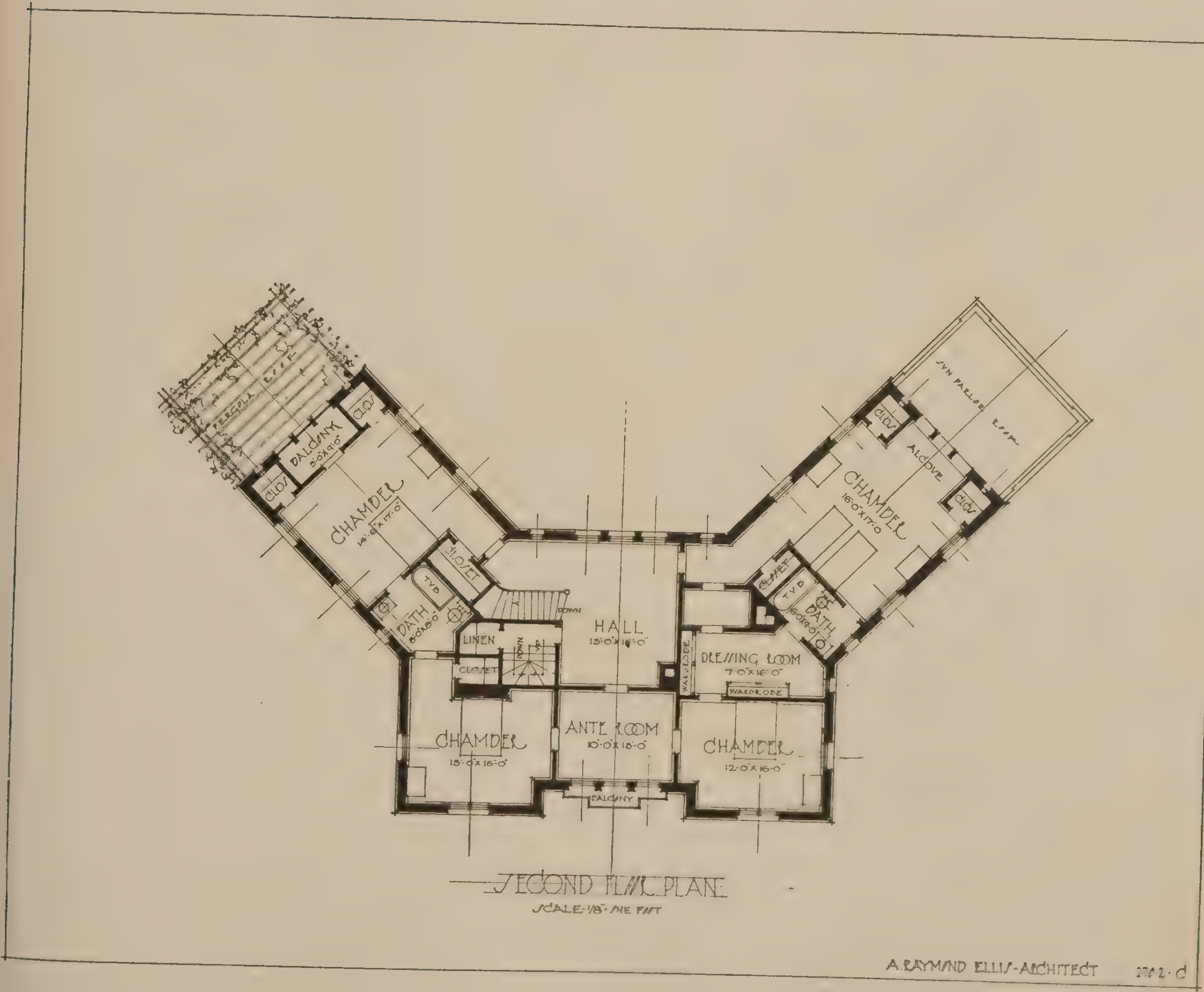


DESIGN FOR RESIDENCE.

Construction of the Small House

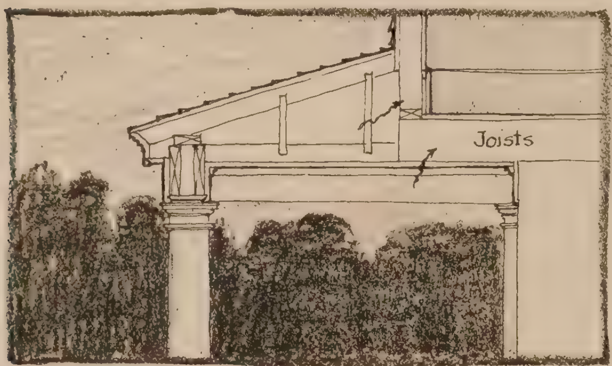
By H. Vandervoort Walsh

Instructor in Architecture, Columbia University

Article VIII

POOR METHODS OF CONSTRUCTION EMPLOYED BY UNSCRUPULOUS BUILDERS

IT would be an endless task to list and describe all of the possible faults of construction which an unscrupulous builder might use in the erection of a small house, and, indeed, it would result largely in rehearsing all of the details of good construction, and then reversing them, showing that instead of doing the correct thing it was done quite the opposite way. But there are certain obvious and glaring faults of construction which are employed by speculative builders with one purpose in mind, namely, to reduce the cost but maintain a good appearance.



Where The Cold Air Gets In

An intentional and clever disguise of poor construction is, at heart, the dishonest thing against which this article is written. The defects of construction which are either the result of ignorance or unskilled labor, while they are bad enough, are not malicious, but those defects which are intentionally planned are simply systems of stealing, and they are usually found in the so-called speculative house, which the unwary public buys in preference to securing an honest house, designed by an architect. And it is this system of dishonest construction that makes the speculative house seem, on the face, cheaper than the honest house.

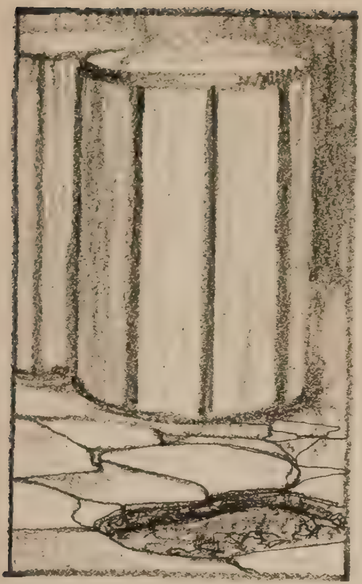
Indeed, it is the whole intention of such dishonest methods of building to make the house seem, on the face of it, substantial, good-looking, and honest, but to hide beneath the glamour of its exterior weaknesses of structure which will cause all kinds of failures after a few years of standing. So long as the house stands together until the builder has sold it to some unsuspecting buyer, that is all that interests him.

In observing some of these dishonest methods of construction it is well to keep in mind that they will appear on the exterior well done, but that their faults are hidden, and intentionally planned to reduce the cost for the builder.

In order to systematize our observations along these lines let us imagine a house which we will inspect in an orderly fashion. We will begin with the cellar and proceed upward to the roof. This house is an ordinary frame dwelling upon a stone foundation.

Entering the cellar-door, the first thing we notice is that at the base of the stairs leading to this door is a puddle of water left from the last rain-storm. Upon inquiring concerning it we learn that in every rain-storm, and especially during the winter when the ground is frozen, the surface water flows down the steps, collects in the areaway in front of the cellar-door, and overflows the sill into the cellar itself—all because the builder had omitted a drain-pipe in the centre of this area to save money. Becoming interested in this matter of drainage we look around at the areas under each of the cellar-windows and find that the drains have been omitted from these, and that a few broken pebbles were thrown into the bottom to give the impression that the water could drain off into the soil, and all this to save money and deceive the buyer. Inspecting the ground around the foundation wall we notice that about each leader the earth has been worn down by dripping water, as though the leader had backed up and the gutter had overflowed. Inquiry shows that such is the case in every rain-storm. Apparently the outlet for the leader has been stopped up, so, in order to find out whether this is true, we need to remove the lower section of the leader from the terra-cotta pipe to look into it, for often it becomes clogged at this point with leaves and dirt. Breaking away the cement joint and pulling gently upon the sheet-metal leader we suddenly find that it crumbles in our hands, and that the leader consists of a coat of paint holding a few particles of rust together. Yes, cheap, thin, so-called galvanized-iron leaders to save money and deceive the buyer! But continuing our search for the stoppage we poke our cane into the section of terra-cotta pipe projecting above the ground which received the leader, and find that it stops short. Twisting it around to remove the material which seems to block the pipe we find, much to our surprise, that the entire section of terra-cotta pipe breaks off, and then looking closer, we find that this pipe does not connect with a cast-iron drainage-pipe leading to the plumbing system or to a dry well, but had merely been stuck into the ground to give this appearance and to save money and deceive the buyer. No wonder the leader backed up and the gutters overflowed in a rain-storm!

By this time we have become very suspicious of the house, so that when we finally go down into the cellar our attention is attracted to a section of the cement floor near the furnace where the large ash-cans are standing. The top surface has cracked under the weight of the cans, and it appears to be in thin slivers of cement. Leaning down and prying under one of these cracked pieces with a knife, a thin slab of concrete, about a quarter of an inch thick, is lifted up from the floor, and beneath this slab we find about 2 or 3 inches of tamped ashes, and then dirt. We marvel that this floor has lasted even as long as it has with so much water running into the cellar in damp weather. Think of it, 2 inches of ashes and a quarter of an inch of cement mortar on the top, when the correct method of building is to lay about 6 inches of cinders for a foundation, then 3 inches of concrete on top of this, and finally a top coat, 1 inch thick, of cement mortar over all.



The Poorly Made Floor

Fresh Air Inlet Under Window

The Fake Leader

Looking up from the floor we are rather impressed by the clean, whitewashed effect of the walls of the cellar, and one would hardly believe that it was a damp one, but around the windows and at certain points in the wall the whitewash is streaked with black, as though water had leaked in. Going over to these places in the wall it is quite evident that during the winter and damp season water has soaked through these crevices. Poking around with a penknife we are amazed at the ease with which the knife penetrates the mortar between the joints of the stones. Working at it a little harder with the knife soon shows that if the cellar were a prison it would not be very hard to scratch one's way out through that wall. Suddenly, without warning, one of the stones in the wall drops out onto the floor, and we get a view of the construction within. For certain, it is one of those stone walls built up with two faces, not bonded together, except by mortar which seems to be made up of mud and a small trace of lime, which lime has disintegrated with the constant dampness to which it has been subjected. A piece of the mortar we find can be crumbled easily in the hand. This is evidence of the employment of the cheapest kind of labor for the masonry work and the cutting down of expense in using poor materials. We only have to look closely to see that there is developing a long diagonal crack in the wall, and we can imagine that if the contractor built so poor a wall above the ground, the chances are that there is no footing beneath it. Near at hand a large bulge is noticeable, and when we hit it with a hammer the whole thing has a rotten sound, for the inside face is bulging inward from the load upon it and the uneven settling of the foundations.

Looking up now at the neatly whitewashed ceiling we cannot help but be suspicious of the plaster beneath the surface, so going over to that part of the ceiling above the smoke-pipe leading from the furnace to the chimney we jab our cane against it, and, as we expected, a big slab breaks off and crashes to the floor, revealing partly charred wooden lath beneath, which have been baking in the heat rising from the smoke-pipe, and which would eventually catch fire. Examining the plaster very closely we observe that in addition to being a very thin coat it has no hair in it to act as a reinforcement for the plaster key which held it to the lath base.

But being rather inquisitive about the construction hidden behind the plaster, and having broken some of it down, the removal of the few lath is worth the look behind them. And there we see the girder which supports the floor-joists resting upon the chimney instead of on a special pier or column. This saved the contractor the cost of the pier or the column, but the owner would probably loose his house some day by fire creeping through the joints of the brick-work of the chimney to the ends of this wooden girder, for it was quite evident that the mortar used in the chimney was not much better than that used in the wall, and it is well known that lime mortar disintegrates under the action of hot gases from burning wood.

Turning our attention now to other parts of the cellar we notice that in the floor of the laundry a place had been broken into, and upon inquiry we find that this hole was dug by the plumber in repairing a stoppage of the system of drainage-pipes under the floor. It seems that the contractor had omitted placing any clean-outs in the pipes which he had laid under the cellar floor, and the owner's wife by accident, in pouring a pail of wash water down the water-closet in the cellar, had allowed a rag to go down with it which clogged up the system, so that the waste from the kitchen sink began to back up into the laundry tubs. As there was no way to get at the pipes, the plumber in cleaning out the system was obliged to break through the floor and cut out a hole in the pipe to run a wire through to the clean-out on the house-trap. The contractor who built the house had saved about fifteen dollars in omitting this clean-out, but the owner lost fifty dollars in plumbers' bills before he repaired this defect.

Another defect was also found by the owner in the system of water-supply. There had been installed only one shut-off cock for the entire building, so that whenever a new washer had to be placed upon a faucet on any fixture the entire system had to be turned off. As most of the faucets throughout the house were of very cheap design, this had to be done very often, until one day the owner had

turned the main shut-off cock once too often for its strength and the handle broke off. He was obliged to call in the plumber to turn the water on again, as well as install a new shut-off cock.

Questioning the owner further, we learn that a disagreeable odor of sewage enters the dining-room windows during the summer months when all the sash are open, but as he admits he knows little about plumbing, he isn't sure of its cause, but he thinks it comes from a pipe which opens directly beneath one of these windows. When we investigate we find that it is the fresh-air inlet of the plumbing system of the house. The contractor had saved money on piping by carrying this to the nearest outdoor point, which happened to be directly under the window of the dining-room, so that whenever any water-closet was flushed in the house a puff of foul air was blown out of this pipe in the most convenient place for it to enter the house if the windows were open. Instead of spending the extra money for piping to carry this fresh-air inlet well away from any windows, the contractor had put in the shortest length possible.

After looking at this pipe we glance at the porch near by and notice that it is beginning to sag. So crawling under the porch we find that instead of masonry piers under the porch columns, there are wooden posts driven into the ground, and that not only have these begun to settle under the weight but also have rotted away considerably near the ground, where they are subject to dampness. While we are under here we notice that the floor-joists are small, 2-by-4 inch timbers, and have sagged a great deal because of their extreme scantiness for the span over which they are placed.

In fact, as we walk up on the porch it vibrates under our weight, and when we enter the house we notice the same weakness, only to a slightly less degree. The owner says that in the beginning the floors were stiff enough, but that this weakness had been getting worse each year. It is evident that there is faulty bridging and too small timbers. Probably, in the beginning the nails of the upper flooring helped to stiffen the beams, but as these became worn in their sockets, the joists lost this additional strength. This lack of proper-size framing timbers saved the builder money but would cost the buyer a pretty penny some day.

But we are astonished at the excellent appearance of the floors, for by this time the things that are good are more surprising than the things that are bad. Then it occurs to us that of course the floor would be good, for this is part of the house which is visible and helps to catch the buyer's eye. But later, when we go up-stairs, we notice that the floors are not so fine, but are the common flat-grained boards which sliver off and catch in your shoe if you scuffle. The owner also points out the kitchen as one of the biggest fakes he has seen. It has an oak floor, and when he had bought the house he had been deeply impressed with the luxury of having an oak floor not only in the dining-room but also in the kitchen. But he is not so keen now, for with constant scrubbing the cheap varnish and filler had come off and the pores of the oak have been exposed, so that now the floor is the greatest catch-dirt ever invented, and to make matters still worse the oak had been poorly seasoned, the boards had shrunk, the cracks opened, and there is no underflooring below to prevent the dust and dirt from sifting through these cracks from the hollow space between the floor-joists. The owner says he is about to install a new floor. He also admits that the varnish which gave such a fine surface to the dining-room and living-room floors when he first saw the house was so poor, and scratched so badly, that he had to have the floors completely done over.

Glancing around at the walls of the living-room and the dining-room we notice that the wall-paper has cracked in a number of places, pulled up, and curled away. It is supremely ugly and unkempt, and we remark about it to the owner. He says that he is completely discouraged about it, that he has tried everything to make the wall-paper stay down, but that as soon as the winter comes on, the steam-heated air on the inside and the cold air on the outside seem to draw the paper up and away, pulling the surface of the plaster with it. He has glued large pieces of paper which have curled up in this manner back into position again, but the plaster was so weak that as soon as the paper began to peel off, the top layer of plaster pulled away with the paper. In fact, examining one example of this, we observe that the paper which had sprung loose from the wall has underneath it a thin coat of plaster about a sixteenth of an inch thick, showing that the glue had fastened the paper to the plaster, but the plaster itself had given away. This type of plastered wall is the result of using cheap materials, and it is another evidence of the extremes to which contractors will go to save money and deceive the buyer.

As we pass by one of the pockets into which the sliding-doors roll we feel a draft coming out of it, and we question the owner whether the house is cold in winter, and he admits it is worse than we suspect. He informs us that it is especially cold on the second floor in those rooms where the floors project over the porch. We ask him whether he has noticed any drafts coming in through the cracks around the base-boards and trim, and he points to these cracks, showing us bits of cotton which he has plugged into them. We suspect that what is the trouble is the omission of sheathing-boards over the studs between the roof of the porch and the ceiling-joists where this roof intersects with the house wall, and also the failure to fill with cinders the space between the floor-joists of the projecting part of the room which extends over the porch. That this is true the owner admits, for he had noticed it while repairing a few shingles on the roof of the porch. The contractor had saved a little money by this trick, and no one could tell that he had done it by merely looking at the exterior.

This same line of inquiry leads us to ask the owner about the heating-plant, and we find that the house cannot be properly heated. We therefore suspect that the radiation is too small, so we calculate the required size of a radiator for one room, and find that the one actually installed is too small. Yet, as the owner says: "When I bought the house, how was I to know that there was not a large enough heating-plant?"

We inquire then whether he has any trouble with the fireplace, which we presume he must use to help out on cold days. He admits he cannot keep it from smoking badly. So we go over to it and run our hand up into the throat to feel around, and find that there is no smoke-chamber, and, what is more, the flue is only about 4 inches by 8 inches, and is not even lined with terra-cotta flue tile. We inform him that he will never have a good fireplace draft until that chimney is rebuilt, and that the size of the flue looks more like the vent for a gas-log than anything else.

We then went through the house noting as many defects as we could, which were beginning to make their appearance. For example, we find that all the doors are badly sagging, showing that the blocking has been omitted from the back of the jambs where the butts are screwed on. The putty in the windows is crumbling out, as though it were clay. All the thresholds are of soft wood and are wearing badly. The trim in many places was springing and twisting, due to the use of cheap and poorly seasoned wood and

THE DEFECTIVE PLASTER

THE LOCK THAT NEVER STAYS CLOSED

the omission of enough nails. Some of the door-stiles are made of two pieces which have opened up at the joints and left ugly cracks. All the stairs squeak badly, indicating that they had been poorly built. Some of the balusters have worked loose and rattle in their mortices, and the hand-rail shakes when it is grasped.

We notice a number of stained ceilings, and inquire about the roof. We are informed that it has leaked badly in the valleys, where the tin is not wide enough to prevent the water which runs down one slope from washing up under the shingles of the adjoining slope and over the edge of the flashing tin of the valley into the house. We learn also that the shingle roof of the porch, which has a very slight incline, continually leaks, and looking out upon it we notice that the shingles are set nearly 7 inches to the weather instead of less than 4 inches, as they should be for so small a pitch.

We notice that it has leaked around the windows, and observing the top of the trim on the exterior, note that there is no flashing over it to throw off the water flowing down from the clapboards. While we are examining the windows the owner volunteers to tell us about his experience with the windows on the second floor. After he had bought the house he found that only one window in each bedroom had any weights and sash-cords in it, and that he had to buy these for all the other windows when he discovered it. He says he never thought of trying each window before he purchased the place.

Just then we happen to be looking at the lock on one of the doors, and we spy one of those back-handed locks which never holds the door closed and which always catches and keeps one from closing the door unless the knob is turned. It is a right-hand lock placed upon a left-hand door. We recognize in this the contractor's efforts to use up all the second-hand odd bits of hardware which he possessed.

By this time we find ourselves so disgusted with the sharp tricks of dishonest building that we call a halt at looking farther, but we feel quite convinced that there is a real difference in quality between such a speculative house and the honest house of an architect's designing, and, what is more, we feel convinced that there is a real reason for the architect's house costing more in the beginning than such a house, but that in the end the cheap speculative house is the most costly proposition which a buyer can invest his money in.

Announcements

New Directory and Market Data Book.—Crain's Market Data Book and Directory of Class, Trade, and Technical Papers, now on the press, promises to be of unusual interest to advertisers generally and users of trade and technical papers in particular. It not only lists all of the business publications of the United States and Canada, giving circulations, rates, type-page sizes, closing dates, etc., but supplies a market analysis of each trade, profession, and industry. Thus the reader is given the basic facts of each line in which he may be interested, including its buying power, buying methods, character of requirements, etc. The volume, which is bound in cloth and contains nearly 500 pages, is published by G. D. Crain, Jr., 417 S. Dearborn Street, Chicago.

The Iron Products Corporation of 90 West Street, New York City, have purchased the capital stock of the Molby Boiler Company, Incorporated, of 101 Park Avenue. The following officers have been elected: G. A. Harder, president; R. R. Rust, vice-president; Stephen Barker, secretary and treasurer. Mr. G. A. Harder is the president of the Iron Products Corporation. It is the intention of the new company to equip a plant which they recently purchased at Mount Union, Pennsylvania, for the exclusive manufacture of Molby boilers. It is their purpose to specialize the magazine-feed down-draft type of boiler, not only increasing the output, but to develop the market for the boiler in all fields of low-pressure heating. Mr. E. C. Molby, the founder of the Molby Boiler Company, Incorporated, will continue as general manager of sales for the new company.

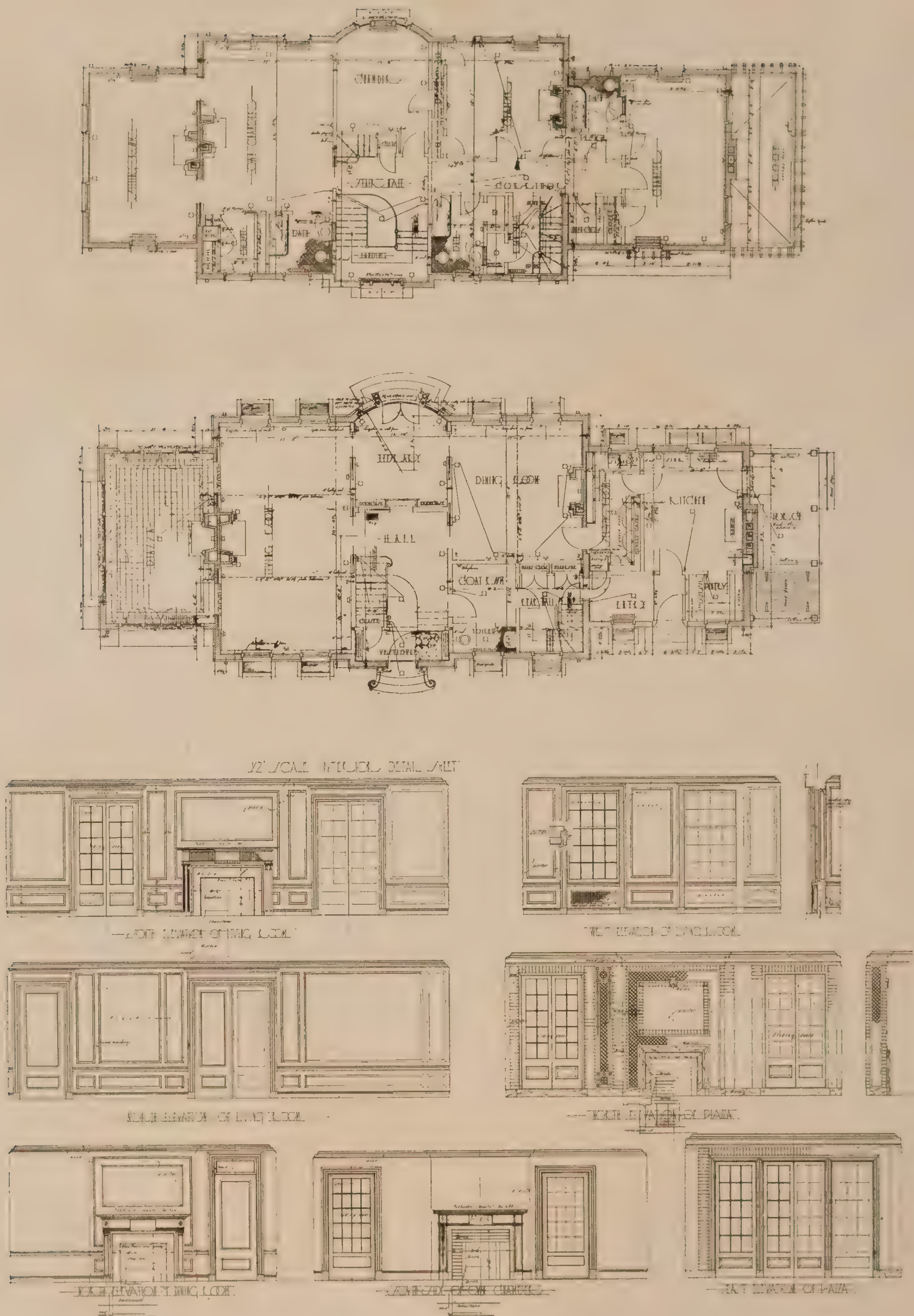
Dwight P. Robinson & Company, Incorporated, engineers and constructors, of New York, have recently opened branch offices in Montreal in the Dominion Express Building. Alexander C. Barker, vice-president, is in charge of the office. The company is a consolidation of Westinghouse, Church, Kerr & Company, Incorporated, and Dwight P. Robinson & Company, Incorporated.

The firm of Peuckert & Wunder, 310 Chestnut Street, Philadelphia, has without change of personnel moved its offices to 1415 Locust Street, where the new telephone numbers are Bell: Spruce 4500, Keystone: Race 5100, and the new name Clarence E. Wunder, Architect and Engineer.

Mr. C. Howard Crane, of Detroit, Michigan, announces the opening of a New York office, at 562 Fifth Avenue, under the direction of Mr. E. M. Mlinar, formerly with Thomas W. Lamb, of New York City. Samples and catalogues requested.

Leonard Schultze and S. Fullerton Weaver, C.E., have formed a partnership for the practice of architecture, under the firm name of Schultze & Weaver, and have leased, through Douglas L. Elliman & Co., the entire seventh floor of the Elliman Building, 17 East 49th Street. Mr. Leonard Schultze has been associated for the past twenty-two years with the firm of Warren & Wetmore, architects, and Mr. S. Fullerton Weaver, C.E., has erected and owned many of the most prominent apartment houses on Park Avenue, and has been largely instrumental in the great development of that section.

Clement W. Baker, president of the Waynesburg, Ohio, Board of Education, wants to secure specimens of foreign as well as American woods for use in the manual training department. He is especially interested in samples of foreign woods.



PLANS AND DETAILS, HOUSE FOR MRS. JOHN AVERY INGERSOLL, HARTFORD, CONN.

A. Raymond Ellis, Architect.

PERSPECTIVE AND ELEVATIONS, HOUSE FOR MRS. JOHN AVERY INGERSOLL, HARTFORD, CONN.

A. Raymond Ellis, Architect.

Concrete Construction

By DeWitt Clinton Pond, M.A.

FIFTH ARTICLE

IN the last two articles the loads on columns were determined and the design for the columns was explained. There was nothing complicated about the calculations, and once the loads were determined the design was a comparatively simple matter.

In this article the design of footings will be discussed. The footings under the interior columns will be investigated first, as these are somewhat less complicated than the continuous footings under the wall columns. The footing under column 59 is a square, pyramidal footing, and, if the calculations given in the fourth article of this series are referred to, it will be found that the load brought to it by the column is 1,465,000 pounds, or 733 tons. Assuming that the load of the footing itself is 67 tons, the total load on the soil is 800 tons. If the soil is good for 4 tons per square foot, the area of soil under the footing must be 200 square feet. The footing will measure 14 feet 1 inch square. If the considerations taken up in Article XVI of "Engineering for Architects" in the October, 1916, number of ARCHITECTURE are born in mind, the following calculations will not need much explanation.

The upward pressure per square foot of the soil, which will produce bending and shear in the footing, will be 733 tons divided by 200 square feet, or 3.66 tons. The net area of the base of the footing, exclusive of the area directly under the column, will be $200 - 10.5 = 189.5$ square feet. Multiplying this area by the unit pressure it will be found that the upward shearing force will be $189.5 \times 3.66 = 693.6$ tons, or 1,387,000 pounds. The column section in the basement story is 3 feet 8 inches, or 44 inches in diameter, and its circumference is 138.23 inches.

As it is usually the punching shear which determines the depth of a footing, the depth will be determined on this basis first.

With the shearing value of concrete taken as 150 pounds per square inch, the shearing force as 1,387,000 pounds, and the circumference of the column as 138.2 inches, the depth can be determined by the following calculations:

$$138.2 \times \tfrac{7}{8} \times d \times 150 = 1{,}387{,}000$$
$$d = 76.5 \text{ inches}$$

As it is customary to allow $4\tfrac{1}{2}$ inches under the steel, the actual depth will be $76.5 + 4.5 = 81$ inches, or 6 feet 9 inches.

By referring to the footing plan, shown in Fig. XI, it will be noted that the footing for column 59 is marked *D* and that it is the only one in the section of building under consideration that is so marked. However, in the general plan of the entire building there are several footings which are very similar to the one under consideration, and these are all designated by the letter *D*. The reason for doing this is obvious. It is desirable to have as many similar footings as possible in order to save form work and a considerable amount of calculation. Therefore, when loads, column diameters, and soil conditions are found to be practically the same, a single design is made to apply to as many footings as possible.

In many cases, however, the loads are not exactly alike, but vary slightly. Confronted by this condition the designer simply takes the heaviest load found in the group of similar columns and designs his footing for this load. In the *D* group of footings it was found that there was one carrying a column that had a load slightly greater than that of column 59, and the footing was made 6 feet 11 inches deep. The additional cost of excavating 2 inches would be slight and the cost of concrete would be counteracted by the saving of steel. As the footing grows deeper, the steel becomes lighter. Therefore, in the footing schedule, Fig. XII, it will be found that the depth of the footing is given as 6 feet 11 inches.

By referring to this schedule it will be seen that all the dimensions for the footing are given. At its base it measures

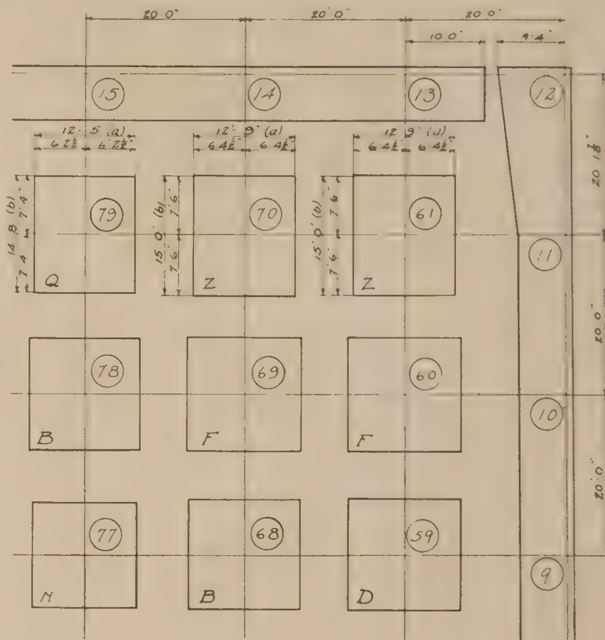


FIGURE XI

14 feet 1 inch square. It is 6 feet 11 inches deep, and the area at the top is 4 feet 2 inches $\times$ 4 feet 2 inches, which is a square with sides 3 inches longer than the diameter of the column. With these figures before one it is possible to check the weight of the footing in order to determine if the assumed weight of 67 tons is correct. The formula $V = d/_6 \times (A_1 + A_2 + 4A_3)$ can be used, and by multiplying V—the volume—by 144 pounds the weight of the truncated pyramid of concrete will be found. By adding this to the weight of the prism of concrete at the base of the pyramid the total weight of the footing will be found to be approximately the same as the assumed weight.

d will equal 6 feet 11 inches minus 6 inches, or 6.41 feet.

A_1—the area at the top—will equal $4.16 \times 4.16 = 17.35$ square feet.

A_2—the area at the bottom—will equal 200 square feet.

A_3—the intermediate area—will equal $9.12 \times 9.12 = 83.17$ square feet.

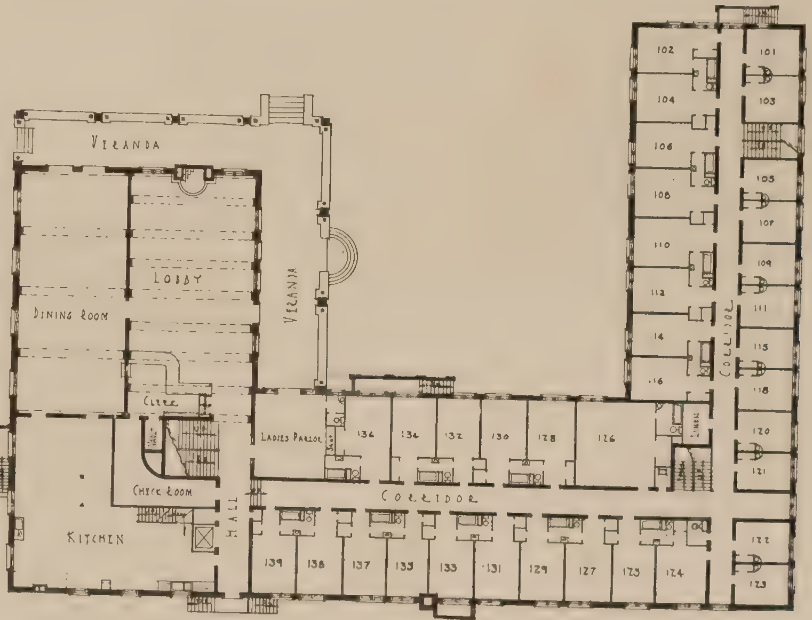
$V = (6.41 \div 6) \times (17.35 + 200 + 4 \times 83.17) = 1.07 \times 550 = 588.5$ cubic feet.

The volume of the prisms at the base will equal $200 \times .5 = 100$ cubic feet, and the total contents will be 688.5 cubic feet. The weight will equal 99,144 pounds, or 50 tons. The assumed weight was 67 tons, and therefore the design is safe. There might be a slight economy in assuming a lighter weight of footing, but the figures given above are accurate enough.

Practically the entire building will be made of material produced locally. The foundation is of the red sandstone taken from the old Tithing Office and wall, the brick were moulded by hand out of the clay taken from the basement excavation, laid in mortar of lime burned in kilns just at the edge of the town; the lumber was sawed from the logs of the Dixie-Sevier National Forest. The building was designed by a local architect, the construction is being handled by a local builder, and practically all of the work will be done by local artisans.

The stock was subscribed by the people, many of them paying for the same in labor, produce, and in other ways—following the ideas of their pioneer forefathers in the "putting over" of public enterprises.

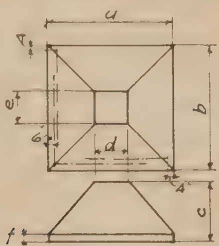
When it is taken into consideration that this great task was accomplished during the panic of 1920, it will stand out as one of the most interesting things that will be seen by the tourist in his travels.



DESIGNS FOR CEDAR CITY HOTEL, CEDAR CITY, UTAH.

Randall L. Jones, Architect.

The next step is the determination of the number of ¾-inch square reinforcing bars needed in the footing. First the bending moment in the footing must be found. The equivalent square will have a side equal to seven-tenths of the diameter of the circular column, or $3.66 \times .7 = 2.56$ feet, which equals 2 feet 6¾ inches. The trapezoid, assumed for the determination of the bending moment, will have a base 14.08 feet long, a side parallel to the base 2.56 feet long, and



Column	Load	Size a	Size b	Size c	Size d	Size e	Size f	Parallel to a No	Parallel to a Size	Parallel to a Length	Parallel to b No	Parallel to b Size	Parallel to b Length	Bonds
59	1.465.000	14'1"	14'1"	6'11"	4'2"	4'2"	6"	24	3/4"□	11'0"	24	3/4"□	11'0"	
60	1.526.000	14'3"	14'3"	6'8"	4'4"	4'4"	6"	26	3/4"□	11'2"	26	3/4"□	11'2"	
61	1465.000	12'9"	15'0"	5'7"	2'11"	5'2"	6"	29	3/4"□	9'9"	23	3/4"□	12'0"	
68	1441.000	13'10"	13'10"	6'8"	4'2"	4'2"	6"	23	3/4"□	10'9"	23	3/4"□	10'9"	
69	1.508.000	14'2"	14'2"	6'8"	4'4"	4'4"	6"	25	3/4"□	11'0"	25	3/4"□	11'0"	
70	Same as 61													
77	1.273.000	13'2"	13'2"	6'8"	3'10"	3'10"	6"	19	3/4"□	10'5"	19	3/4"□	10'5"	
78	1.418.000	13'10"	13'10"	6'8"	4'2"	4'2"	6"	23	3/4"□	10'9"	23	3/4"□	10'9"	
79	1.311.000	12'5"	14'8"	5'3"	2'11"	5'2"	6"	27	3/4"□	9'6"	21	3/4"□	11'9"	

FIGURE XII

an altitude of 5.76 feet. The central rectangle will have an area of $2.56 \times 5.76 = 14.74$ square feet. The two triangles will have a combined area of 33.18 square feet. The pressure per square foot has been determined as 3.66 tons per square foot, or 7,320 pounds, and the upward pressure on the rectangle will be $14.74 \times 7{,}320 = 107{,}900$ pounds, and on the two triangles 242,880 pounds. The moments will be 107,900 $\times$ 2.88 = 310,750 foot-pounds, and $242{,}880 \times 3.84 = 932{,}660$ foot-pounds, and they will total 1,243,410 foot-pounds, or 14,920,920 inch-pounds.

$$S = \frac{14{,}920{,}920 \times 8}{78.5 \times 7} = 217{,}200$$

$$217{,}200 \div 16{,}000 = 13.57 \text{ square inches}$$

As ¾-inch square rods are to be used, their area will be .5625 square inches, and there will be needed 24 bars.

Although the calculations given above are not complicated, they can be given in a more simple form. The reader will have no difficulty in observing how the factors of the previous paragraphs are used by engineers.

$$2.56 \times 5.76 \times 7{,}320 \times 34.26 = 3{,}710$$
$$(5.76)^2 \times 7{,}320 \times 69.12 \times .666 = 11{,}190$$
$$M = 14{,}900$$

$$\frac{14{,}900 \times 8}{78.5 \times 7} = 217$$

$$\frac{217}{16} = 13.5$$

$$\frac{13.5}{.5625} = 24$$

The above calculations were carried out in units of thousands of pounds, or *kips*, a common practice among engineers.

In the footing schedule, Fig. XII, there is one item which has not been investigated and this is the length of the steel bars. It is customary to extend the bars 40 diameters beyond the column, or, in the case of square bars, a distance equal to 40 times the length of one side. In the present case the bars are ¾-inch square bars and the distance which they will extend beyond the column is 30 inches. As the column has a diameter of 44 inches, one-half this diameter is 22 inches and the distance from the centre line to the end of the bar is 52 inches, or 4 feet 4 inches. On the other side of the centre line a different condition governs the length of the reinforcing bars. On this side it is customary to have the bars run within 4 inches of the outside of the footing. The footing is 14 feet 1 inch square, and one-half of this dimension is 7 feet approximately. Deducting 4 inches from this leaves 6 feet 8 inches. By adding 6 feet 8 inches and 4 feet 4 inches the length of the bars is found to be 11 feet.

The bars are set alternately so that one bar will be 4 inches from the right side of the footing and the next will be 4 inches from the left side. In no case, however, will a bar project less than 40 diameters beyond the column.

This completes the design for the footing under column 59. The next footing is the one under column 60, and this, it will be noted by referring to the footing plan, Fig. XI, is designated by the letter *F*, as is also the one under column 69. These are similar and there are two other *F* footings in the general plan. Column 60 brings the heaviest load to the footing—1,526,000 pounds—and this will be used in the design.

The column has a diameter of 3 feet 10 inches.

The area of earth to be covered will be determined on the same basis as was used in the case of column 59, except that the weight of the footing will be taken as 50 tons. The total load of column and footing is 813 tons and the area is 203 square feet. The footing is therefore 14 feet 3 inches square. The unit upward pressure is 7,517 pounds per square foot. The net area of the footing is 192 square feet and the shear will be $192 \times 7{,}517 = 1{,}443{,}264$ pounds. The circumference of the column is 144.51.

$$144.5 \times \tfrac{7}{8} \times d \times 150 = 1{,}443{,}300$$
$$d = 76.1 \text{ inches}$$

The over-all depth will be 80.6 inches, or 6 feet 8 inches, and the next step is to find the number of ¾-inch square bars needed for reinforcement. The equivalent square is 32.2 inches square, or 2.68 feet, and the distance from the edge of the square is 5.79 feet, or 69.5 inches.

$$2.68 \times 5.79 \times 7{,}517 \times 34.75 = 4{,}050$$
$$(5.79)^2 \times 7{,}517 \times 69.5 \times .666 = 11{,}600$$
$$15{,}650$$

$$\frac{15{,}650 \times 8}{76.1 \times 7} = 235$$

$$\frac{235}{16} = 14.7$$

$$\frac{14.7}{.5625} = 26$$

The footing under column 60 will cover a soil area measuring 14 feet 3 inches. It will be 6 feet 8 inches high. The top of the footing will measure 4 feet 4 inches on a side, as each side is 6 inches greater than the diameter of the column.

There will be 26 ¾-inch bars placed in each direction, and they will be 11 feet 2 inches long.

The footings under columns 61 and 70 will be considered together, as they are exactly alike. It will be remembered that the design of these two columns was discussed in the fourth article of this series and that they were found to be rectangular columns measuring 2 feet 2 inches by 4 feet 2 inches at the first story. In the basement the dimensions increase to 2 feet 5 inches by 4 feet 8 inches, and the load on the footing is 1,465,000 pounds. The area of soil to be covered will be found to be 195 square feet if the weight of the footing is taken as 50 tons. It will be necessary to find a rectangular area of soil, having sides which will project equally in both directions beyond the column, and which, when multiplied together, will give an area of 195 square feet. Largely by trial it will be found that by adding 5 feet 2 inches on all sides of the column the resulting rectangle will measure 12 feet 9 inches by 15 feet, and will cover an area of 191 square feet.

The load brought to the footing by the column is 1,465,000 pounds and the pressure in an upward direction of the soil, which will cause sheer and bending, is $1,465,000 \div 191 = 7,670$ pounds per square foot. The net area of the footing is $191 - 11.3 = 179.7$ square feet. The punching shear is $179.3 \times 7,670 = 1,376,500$ pounds. The perimeter around the column is 170 inches.

$$170 \times d \times \tfrac{7}{8} \times 150 = 1,376,500$$
$$d = 62 \text{ inches, or 5 feet 2 inches}$$

The total depth of the footing will be 4½ inches more than this, or 5 feet 6½ inches. To have the dimensions in even figures the depth will be considered as 5 feet 7 inches.

The calculations for the determination of the steel needed for the reinforcing under these rectangular columns is very similar to those given above for the footings under circular columns.

The dimensions of the rectangular column are 2.41 feet by 4.66 feet, and the footing projects 5.16 feet beyond the column in all directions. The rectangle on the *a* side will measure 2.41 by 5.16 and that on the *b* side will measure 4.66 by 5.16 feet. The triangles will have legs 5.16 feet long.

The calculations for the steel parallel to the *b* side are given below:

$$\begin{aligned} 5.16 \times 2.41 \times 7,670 \times 31 &= 2,960,000 \\ (5.16)^2 \times 7,670 \times 62 \times .66 &= \underline{8,400,000} \\ & 11,360,000 \end{aligned}$$

$$\frac{11,360 \times 8}{62 \times 7} = 210$$

$$\frac{210}{16} = 13.08$$

$$\frac{13.08}{.5625} = 23$$

By carrying through similar calculations it will be found that there will be needed 29 bars parallel to *a*.

The lengths of the bars are determined by the projection of 40 diameters beyond the column on one side and within 4 inches of the edge of the footing on the other.

By referring to the footing plan it will be seen that the footings under five columns have been determined. There are still three other interior footings to be investigated, but as these offer no new problems the design for them will not be undertaken in this article.

The design of the exterior footings will be investigated in the next article.

Announcements and Catalogues Received

Catalogue of "Power Transmission Machinery," from the A. & F. Brown Co., engineers, founders and machinists, Elizabethport, N. J.

"Housing Plans for Cities," published by The Southern Pine Association, New Orleans. A summary of the housing plans of various institutions of practical and suggestive value.

"One Hundred and Twenty-Fifth Anniversary of Bird & Son, Incorporated. A Graphic Record of a Manufacturing Enterprise Extending Throughout a Century and a Quarter Under the Guidance of Three Generations of Massachusetts Paper Makers." Bird & Son, East Walpole, Mass.

The Evanston Sound Proof Door, Irving Hewlin, Evanston, Illinois, send us an interesting illustrated pamphlet regarding their product.

"Annual Magazine Subject-Index, 1919." A subject-index to a selected list of American and English periodicals and society publications. Edited by Frederick Winthrop Faxon, A.B. (Harvard). Compiled with the co-operation of librarians. Boston: F. W. Faxon Co. This book is especially valuable for its references to the subjects of art and architecture, and because it contains a record of periodicals not included in the usual periodical indices.

Clinton MacKenzie, architect, of 15 Broad Street, Newark, N. J., has published a book on "Industrial Housing." Mr. MacKenzie writes from practical experience, and the illustrations showing plans and elevations include work with which he has been identified in various places.

The firm of Mauran Russell & Crowell, architects, announce that William F. Wischmeyer and W. Oscar Mullgardt have become associates. Mr. Wischmeyer and Mr. Mullgardt have been with the firm for many years and their loyal co-operation and effective service have brought them the esteem of friends and clients, who will be glad to know of the new relationship thus established.

Lynch Luquer, architect, has removed his office to 819 15th Street, N. W., Washington, D. C., and would like samples from material-men. His Boston office is at 9 Cornhill.

Bernard Wiseltier, landscape architect, has opened offices at 15 East 40th Street, where he will engage in the practice of his profession. Mr. Wiseltier, who is a Cornell University graduate, a member of the American Society of Landscape Architects and of the Architectural League, was for a long time with Vitale, Brinckerhoff & Geiffert.

Geo. Mort Pollard, architect, wishes to announce the removal of his office to No. 250 West 14th Street, New York City.

The architectural practice formerly carried on under the firm name of Bollard & Webster, 520 Paxton Building, Omaha, Neb., will be conducted in the future by James R. Webster at the same address.

Clinton Paine Greer announces the opening of temporary offices at 2209 Roslyn Avenue, Baltimore, for the practice of architecture. Catalogues and samples requested.

The Milwaukee Corrugating Co., Milwaukee, Wis., are sending out a circular of their new expansion corner bead. The exclusive feature of this is the use of expanded diamond mesh reinforcement on the wings or webs instead of practically solid members, as heretofore generally used.

John P. Kingston & Son, architects and engineers, Worcester, Mass., whose offices were in the district included in the recent destructive fire, have opened new offices in the Park Building, and shall be glad to receive catalogues, samples, etc.

Mr. Robert O. Derrick, architect, formerly with Murphy & Dana, architects, New York City, has been admitted as a partner to the firm of Brown & Preston, architects and engineers, of Detroit. The firm has been incorporated under the name of Brown, Preston & Derrick, Architects and Engineers, J. Martin Brown, President, Robert O. Derrick, Vice-President, and Martin A. Preston, Secretary and Treasurer. Mr. Wm. E.. Irving, for some time connected with the firm, has been made Director of Business Promotion. The present offices will be retained at 406–407–408 Empire Building, Washington Boulevard at Clifford Street, Detroit, Mich.

Alexander B. Trowbridge and Frederick Lee Ackerman desire to announce that the partnership of Trowbridge & Ackerman, architects, has been dissolved. Mr. Ackerman will complete the unfinished work of the firm, and will continue the general practice of architecture at 25 West 44th Street, under the name of Frederick Lee Ackerman, architect. Mr. Trowbridge will continue his services as consulting architect to the Federal Reserve Board, Washington, D. C., and to the Federal Reserve Bank of New York, with offices at 120 Broadway, New York. At the expiration of this engagement he will open new offices for a specialized practice as consulting architect.

It is with regret that we announce the death of George U. Rehfuss, past vice-president and for many years an active member of the T-Square Club of Philadelphia.

Frank H. Day and Harry E. Bolton announce the opening of an office for the practice of architecture at 24 North Main Street, Gloversville, N. Y. Catalogues and samples are requested.

Hoggson Brothers regret very much that through an error the name of the architect who designed the Citizens National Bank of Alton, Illinois, was not mentioned in the March issue of ARCHITECTURE. The Citizens National Bank of Alton, Illinois, was designed by L. Pfeiffenberger & Son, Alton, Illinois.

Herbert S. Green has opened an office in Saltillo, Mexico, Apartado 250, and will be glad to receive catalogues and data regarding building materials.

Wells Brothers Construction Company, Monadnock Building, Chicago, send us an interesting report on the much-discussed question of "What Is the Best Form of Building Construction Contract?" "What Is the Real Objective in a Construction Contract?"

The American Radiator Company announce a third reduction on the price of their products.

Every architect and, indeed, every one concerned in building will find the "Portfolio of Working Specifications and Detail," issued by the Bishopric Company, of value. It is an established fact that in the past four years in all kinds of labor there has been a depressing amount of inefficiency and carelessness, and in the use of products, unless specifications and directions are laid down as to how materials should be used properly and effectively, it is very difficult for the architect or owner to protect or obtain the results they are seeking.

We are in receipt of two valuable publications from the Structural Service Bureau, Philadelphia, Chapter 3 of a Series on Structural Slate, "Stairways," and Chapter 5, on "Toilet Inclosures." They are illustrated with drawings of structural details. The Structural Slate Company, Pen Argyl, Pa., are the producers.

THE AMERICAN SPECIFICATION INSTITUTE.—As heretofore produced specifications have been largely the product of individual effort, and as such vary in many features that can be conventionalized so as to be common to all. Owing to a present lack of means for collecting and distributing information concerning specifications and the writing thereof, there is a needless duplication of study, research, and labor on the part of specification writers. Practically all other professions are so organized that the interchange of knowledge is effected with resulting improvement in the quality of production and professional standing. It is to improve the conditions affecting the writing of specifications and to benefit by organized effort that the American Specification Institute is organized. This organization is intended to be national in scope and invites co-operation of all those interested in specifications. Address the American Specification Institute Rooms, 1144 American Bond and Mortgage Building, Chicago.

The National Council of Architectural Registration Boards, 3230 W. Monroe Street, Chicago, has sent us their Circular of Advice No. 2, "General Statement with Reference to Examinations," of interest to every member of the profession.

McKim, Mead & White advise us that the entire credit for the remarkably fine acoustics of New York's new Town Hall are due to Mr. Clifford Melville Swan, acoustical engineer.

From J. B. Lippincott Company, Philadelphia, we have received three additional volumes in their useful "Woodworker Series." We have already mentioned the volume on "Carpentry for Beginners." The new volumes are "Woodwork Joints"—full information as to the uses with clear, practical suggestions, illustrated, for the making of every joint that may be needed; "Fretwork, Fret-Cutting, Inlaying and Overlaying," covered advanced as well as elementary methods; "Staining and Polishing," including "Varnishing and Other Methods of Finishing Wood, with a Complete Index of 1500 References." These are useful and practical as well as handy little books.

Murphy & Dana, architects, announce that R. H. Dana, Jr., and J. Duncan Forsyth have withdrawn from the firm, and that the three remaining members will continue the practice of architecture under the name of Murphy, McGill & Hamlin, 331 Madison Avenue, New York City; Union Building, Shanghai, China.

George C. Winchel, consulting and designing engineer, announces the opening of offices at 304 Everett Building, Akron, Ohio. Clientage is solicited pertaining to engineering service of rolling-mills, rubber plants, industrial equipment and buildings, medium and heavy machinery design.

Damon, O'Meara & Hills, architects, are now operating offices in suite 1123–1124, Merchants National Bank Building, St. Paul, Minn., and 19 East Mason Building, Fort Dodge, Iowa.

FOUNTAIN IN THE HOME OF JOHN J. RASKOB, CLAYMONT, DELAWARE.

Charles Keck, Sculptor.
McClure & Harper, Architects.